Liebert® eXM™ BDC

User Manual—10-100kVA, 60Hz

EMERSON
Network Power

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SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation of the Liebert *e*XM BDC (bypass distribution cabinet).

Read this manual thoroughly, paying special attention to the sections that apply to your installation, before working with the UPS. **Retain this manual for use by installing personnel.**

A properly trained and qualified electrical contractor should oversee the installation of the equipment.

The Liebert *e*XM BDC cannot be put into operation until it is commissioned by the manufacturer or authorized engineer. Otherwise, human safety may be endangered and damage to the UPS will not be covered by the warranty.

The Liebert *e*XM BDC is designed for commercial and industrial uses and cannot be used as life support equipment.

WARNING

Risk of moving heavy equipment and electric shock. Can cause equipment damage, injury and death.

Exercise extreme care when handling UPS cabinets to avoid equipment damage or injury to personnel. The Liebert *e*XM BDC's weight ranges from 660 to 1752 lb. (300 to 794kg).

Determine the unit's weight and locate the center of gravity symbols before handling the Liebert *e*XM BDC. Test lift and balance the cabinet before transporting it. Never tilt equipment more than 15 degrees from vertical.

In case of fire involving electrical equipment, use only carbon dioxide fire extinguishers or those approved for use in fighting electrical fires.

Extreme caution is required when performing maintenance.

Be constantly aware that the UPS system contains high DC as well as AC voltages.

Check for voltage with both AC and DC voltmeters prior to making contact.

AVERTISSEMENT

Risque lors du déplacement de l'équipement lourd et de décharge électrique pouvant entraîner des dommages matériels, des blessures et même la mort.

Faites preuve d'une extrême prudence lors de la manutention des armoires ASC afin d'éviter de les endommager ou de blesser le personnel. Les armoires Liebert *e*XM BDC pèsent de 660 à 1752 lb (de 300 à 794 kg).

Déterminez le poids de l'unité et trouvez les symboles de centre de gravité avant de déplacer l'armoire Liebert *e*XM BDC. Faites des essais de levage et d'équilibre avant de transporter l'armoire. N'inclinez jamais l'équipement à plus de 15 degrés à la verticale.

En cas d'incendie associé à du matériel électrique, n'utilisez que des extincteurs à dioxyde de carbone ou homologués pour la lutte contre les incendies d'origine électrique.

Les opérations d'entretien requièrent une extrême prudence.

Soyez toujours conscient du fait que le système ASC contient des tensions c.c. et c.a. élevées.

Vérifiez les tensions avec des voltmètres c.a. et c.c. avant d'établir tout contact.

WARNING

Risk of electric shock. Can cause equipment damage, injury and death.

As with other types of high power equipment, dangerous voltages are present within the UPS and battery enclosure even after input power has been disconnected. The risk of contact with these voltages is minimized as the live component parts are housed behind a metal panel. Further internal safety screens make the equipment protected to IP20 standards. Never remove panels or covers or open doors that will expose internal components to contact.

Read and follow all warnings, cautions and safety and operating instructions to avoid serious injury or death from electric shock. No risk exists to any personnel when operating the equipment in the normal manner, following the recommended operating procedures.

All equipment maintenance and servicing procedures involve internal access and should be carried out only by trained personnel.

AVERTISSEMENT

Risque de décharge électrique pouvant entraîner des dommages matériels, des blessures et même la mort.

À l'instar des autres types d'équipement haute puissance, des tensions dangereuses sont présentes à l'intérieur de l'armoire ASC et du châssis de batteries même après le débranchement de l'alimentation d'entrée. Le risque de contact avec ces tensions est diminué, car les parties de composants sous tension sont abritées derrière un panneau métallique. D'autres écrans de sécurité internes protègent l'équipement en conformité avec les normes IP20. Ne retirez jamais les panneaux ou les couvercles et n'ouvrez pas les portes donnant accès aux composants internes avec lesquels vous pouvez entrer en contact.

Veuillez lire et suivre l'ensemble des avertissements, des mises en garde et des instructions de sécurité et de fonctionnement afin d'éviter des blessures graves, voire la mort, pouvant être causées par une décharge électrique. Il n'y a aucun risque pour le personnel lorsque l'équipement est utilisé normalement, en suivant les procédures de fonctionnement recommandées.

Toutes les procédures de réparation et d'entretien de l'équipement exigent un accès à l'intérieur de l'armoire et devraient être menées uniquement par du personnel compétent.

Ground Leakage Currents

WARNING

Risk of electric shock from high leakage current. Can cause injury, property damage and death.

EARTH CONNECTION IS ESSENTIAL BEFORE CONNECTING THE INPUT SUPPLY.

Earth leakage current exceeds 3.5 mA and is less than 1000 mA.

Transient and steady-state earth leakage currents, which may occur when starting the equipment, should be taken into account when selecting instantaneous RCCB or RCD devices.

Residual Current Circuit Breakers (RCCBs) must be selected sensitive to DC unidirectional pulses (Class A) and insensitive to transient current pulses.

Note also that the earth leakage currents of the load will be carried by this RCCB or RCD.

This equipment must be earthed in accordance with the local electrical code of practice.

AVERTISSEMENT

Risque de décharge électrique due à un courant de fuite élevé pouvant causer des blessures, des dommages matériels et même la mort.

IL EST PRIMORDIAL D'ASSURER UNE CONNEXION DE TERRE AVANT DE BRANCHER L'ALIMENTATION D'ENTRÉE. La fuite à la terre est supérieure à 3,5 mA et inférieure à 1 000 mA.

Vous devez tenir compte des fuites de courant transitoires et permanentes à la terre, susceptibles de se produire au démarrage de l'équipement, lors de la sélection des dispositifs DDFT instantanés.

Vous devez sélectionner des disjoncteurs différentiels de fuite à la terre (DDFT) sensibles aux impulsions unidirectionnelles c.c. (classe A) et insensibles aux impulsions de courant transitoires.

Notez également que les courants de fuite à la terre de la charge seront acheminés par ce dispositif DDFT.

Cet équipement doit être mis à la terre conformément au code national de l'électricité.

WARNING

Risk of electric shock. Can cause injury, property damage and death.

Under typical operation and with all UPS doors closed, only normal safety precautions are necessary. The area around the UPS system should be kept free of puddles of water, excess moisture and debris.

Special safety precautions are required for procedures involving handling, installation and maintenance of the UPS system and the internal batteries (internal batteries accommodated by the 10-40kVA frame only). Observe all safety precautions in this manual before handling or installing the UPS system as well as during all maintenance procedures. Observe all battery safety precautions before working on or near the battery.

This equipment contains several circuits that are energized with high voltage. Only test equipment designed for troubleshooting should be used. This is particularly true for oscilloscopes. Always check with AC and DC voltmeters to ensure safety before making contact or using tools. Even when the power is turned Off, dangerously high electric charges may exist within the UPS.

All power and control wiring should be installed by a qualified electrician. All power and control wiring must comply with the NEC and applicable local codes.

ONLY qualified service personnel should perform maintenance on the UPS system. When performing maintenance with any part of the equipment under power, service personnel and test equipment should be standing on rubber mats. The service personnel should wear insulating shoes for isolation from direct contact with the floor (earth ground).

Never work alone, even if all power is removed from the equipment. A second person should be standing by to assist and summon help in case an accident should occur.

AVERTISSEMENT

Risque de décharge électrique pouvant causer des blessures, des dommages matériels et même la mort.

Les précautions de sécurité habituelles suffisent lorsque le système ASC est en mode de fonctionnement normal et que toutes les portes sont fermées. La zone entourant le système ASC doit être exempte de flaques d'eau, d'humidité excessive et de débris.

Des précautions de sécurité spéciales sont requises pour les procédures associées à la manutention, à l'installation et à l'entretien du système ASC. Observez toutes les précautions de sécurité décrites dans le présent manuel avant de manipuler ou d'installer le système ASC, ainsi que pendant toutes les procédures d'entretien.

Cet équipement comporte plusieurs circuits à haute tension. Seuls des équipements d'essai conçus pour le dépannage doivent être utilisés. Cette mise en garde couvre notamment les oscilloscopes. Utilisez toujours des voltmètres c.a. et c.c. pour vérifier les tensions avant d'établir un contact ou d'utiliser des outils. Des tensions dangereusement élevées peuvent demeurer dans le système ASC même une fois l'alimentation coupée.

Tous les câbles d'alimentation et de contrôle doivent être installés par un électricien qualifié. Tous les câbles d'alimentation et de contrôle doivent être conformes au Code national de l'électricité des États-Unis (NEC) et celui du Canada, ainsi qu'aux codes locaux en vigueur.

L'entretien du système ASC ne doit être confié qu'à des professionnels qualifiés.

Les responsables de l'entretien et l'équipement d'essai doivent reposer sur des tapis de caoutchouc lors de toute intervention sur une pièce d'équipement sous tension. Les responsables de l'entretien doivent porter des chaussures isolantes pour prévenir tout contact direct avec le plancher.

Ne travaillez jamais seul, même si toute l'alimentation d'entrée est coupée de l'équipement. Une seconde personne devrait toujours être présente pour porter assistance ou chercher de l'aide en cas d'accident.

NOTICE

Risk of improper ground connection. Can cause equipment damage.

Ground connection is essential before connecting the input supply. This equipment must be grounded in accordance with local electrical codes. Maximum load must not exceed that shown on the UPS rating label.

NOTICE

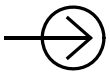
Risk of improper electromagnetic shielding. Can cause radio communication interference.

This unit complies with the limits for a Class A digital device, pursuant to Part 15 Subpart J of the FCC rules. These limits provide reasonable protection against harmful interference in a commercial environment. This unit generates, uses and radiates radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. This unit is not designed for use in a residential area. Operation of this unit in a residential area may cause harmful interference that the user is solely responsible for correcting.

GLOSSARY OF SYMBOLS

Risk of electrical shock

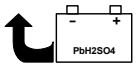
Indicates caution followed by important instructions



AC input

AC output

Requests the user to consult the manual



Indicates the unit contains a valve-regulated lead acid battery

Recycle

DC voltage

AC voltage

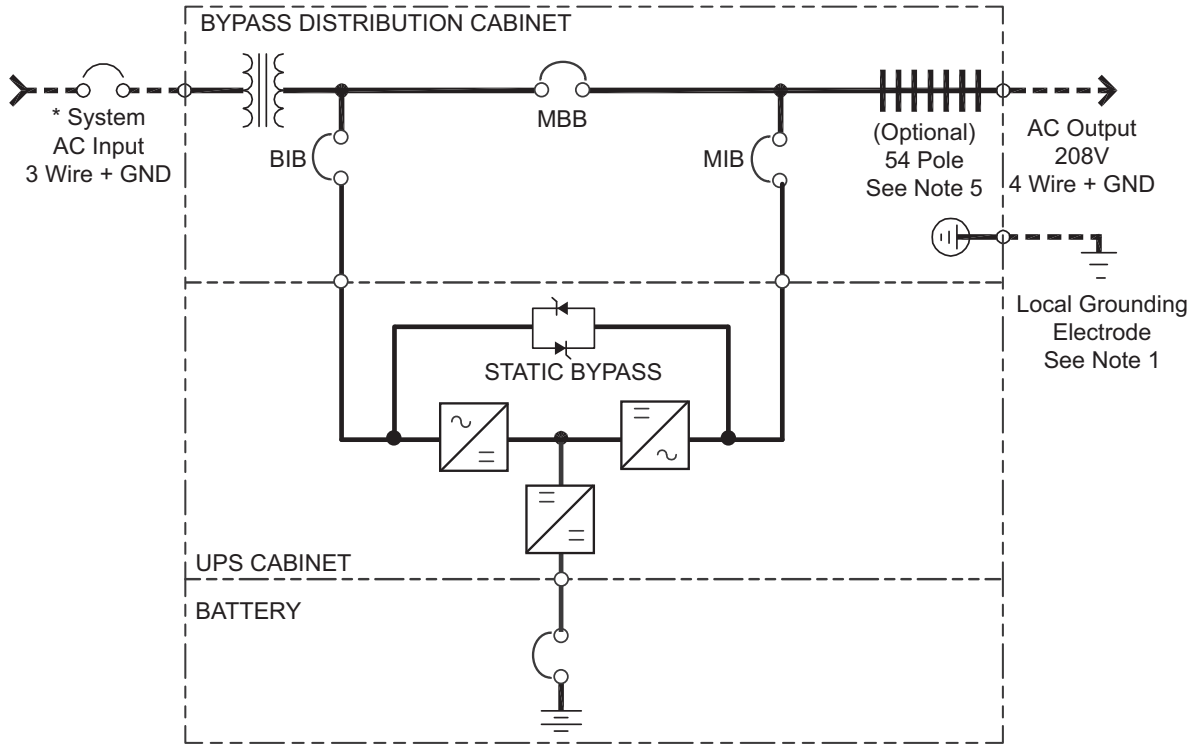
Equipment grounding conductor

Bonded to ground

1.0 LIEBERT *e*XM BDC

The Liebert *e*XM BDC is designed to operate in UPS normal mode, static bypass mode and maintenance mode. The Liebert *e*XM BDC offers 10-100kVA capacity to match the associated Liebert *e*XM frame offerings. Each of the Liebert *e*XM BDC capacities offer optional input 208V, 220V, 480V and 600V internal transformers as well as multiple output distribution selections.

Figure 1 Single input UPS with external Liebert *e*XM BDC with optional internal transformer—Typical configuration



NOTES
1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. UPS system input and output cables must be run in separate conduits.
4. Control wiring must be run in separate conduits.
5. Optional 54-pole, 225A for 10-40kVA frame only or optional 54-pole 400A for 60-100kVA frame only.
6. Transformer available: 208, 220, 480, 600V input.

BIB - Bypass Isolation Breaker
MBB - Maintenance Bypass Breaker
MIB - Maintenance Isolation Breaker
* External Overcurrent Protection by Others
– – – – Field-Supplied Wiring

1.1 Normal (UPS) Mode

While the Liebert *e*XM BDC is in Normal mode (MBB open; BIB/MIB closed), the UPS is supplying the connected load with continuous, high-quality AC power. In this mode of operation, the load is protected by the UPS.

1.2 Maintenance Mode

When the Liebert *e*XM BDC is in Maintenance mode (MBB closed; BIB/MIB open), it provides an alternate path for power to the connected equipment should the UPS need to be taken out of service for limited maintenance or repair. In this mode of operation, no power is supplied to the UPS and the load is NOT protected by the UPS.

1.3 Locating the Cabinet

This Liebert *e*XM BDC may be mounted to the right of the UPS or installed as a stand-alone unit. Ensure that the unit is in a well-ventilated area and that there is clearance for access to the switches and cable connections as required by national and local codes.

When the BDC is ordered as a stand-alone cabinet, connecting cables are not included.

1.4 Cable Installation

1.4.1 Wiring Preparation

Be sure that the unit is not connected to any AC utility power source or UPS before installing any wiring to this unit. This Liebert *e*XM BDC should be installed by a qualified / certified electrician.

WARNING

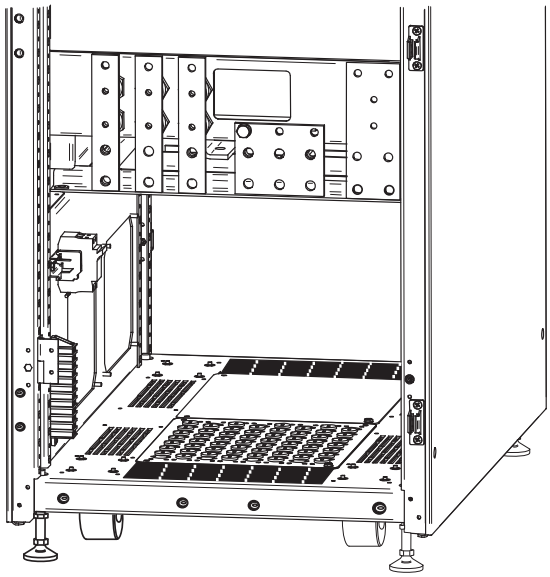
Risk of electrical shock and arc flash. Can cause property damage, injury and death.

Read this section thoroughly before attempting to install wiring to this unit. Read and comply with all warnings and cautions in this manual.

Removing the Cover Plates

Plates cover the input and output terminals on the front of the Liebert *e*XM BDC (see **Figure 2**). Remove these and keep the screws and plates for reinstallation.

Figure 2 Liebert *e*XM BDC—Access plate removed



1.4.2 Power Cable Installation

Refer to **Table 42** when selecting cables.

NOTE

Transient and steady state earth leakage currents may occur when starting the equipment. This should be taken into account when selecting ground current detection devices because these will carry the earth leakage currents of both the UPS equipment and the load.

1.4.3 Input/Output Wiring

Follow the steps below to connect the input wiring:

NOTE
Input wiring must be installed using conduit if cabinet is not mounted to the immediate right of the UPS.

1. Locate the input wiring access (top or bottom access), remove the conduit landing plate and punch the appropriate size hole for the size conduit being used. Pull the three/four input wires through it, allowing some slack for installation. For cabinets that are located to the immediate left of the UPS, the access plate is on the lower right of the cabinet. Remove the access plate and verify that the edge guarding is installed and intact.
2. Secure the conduit to the access plate of the Liebert *e*XM BDC.
3. Input power cables connect to the system input bus; refer to **Figure 14** and to **Table 5**.
4. Connect the ground (earth) wire to the earth busbar and tighten it to 428 lb-in (48Nm) for M12 bolt.
5. Locate UPS input and output cables and access panel to UPS on lower right side.

NOTE
If the Liebert e*XM BDC is not to be bolted to the UPS, use either top or bottom access plate.*

6. Connect the system ground cable between the Liebert *e*XM BDC and UPS and tighten the connections to 428 lb-in (48Nm) for M12 bolt.
7. Connect the system input cables between the Liebert *e*XM BDC "UPS Input" Busbars (A-B-C N terminals) and UPS input busbars (A-B-C N terminals) and tighten the connections to 428 lb-in (48Nm) for M12 bolt.
8. Connect the system output cables between the Liebert *e*XM BDC "UPS Output" Busbars (A-B-C N terminals) and UPS output busbars (A-B-C N terminals) and tighten the connections to 428 lb-in (48Nm) for M12 bolt.
9. Connect TB1 from the Liebert *e*XM BDC to J23, J24 and J26 on the Liebert *e*XM.

NOTICE

Risk of improper wiring connection. Can cause equipment damage.

The control wire must be installed to ensure proper operation of the system and fully protect the load when switching between bypass cabinet and UPS.

NOTES

1. All interconnection hardware supplied by Emerson.
2. AC connections must be made to the UPS module before attaching Liebert *e*XM BDC to UPS module.
3. All cabling will be field-supplied when a Liebert *e*XM BDC is configured as a stand-alone cabinet.
4. Liebert *e*XM BDC's must attach to the right side only of the Liebert eXM UPS.
5. Refer to the individual drawing of each piece of equipment for additional details.

Table 1 Control wiring for Liebert *e*XM to Liebert eXM BDC

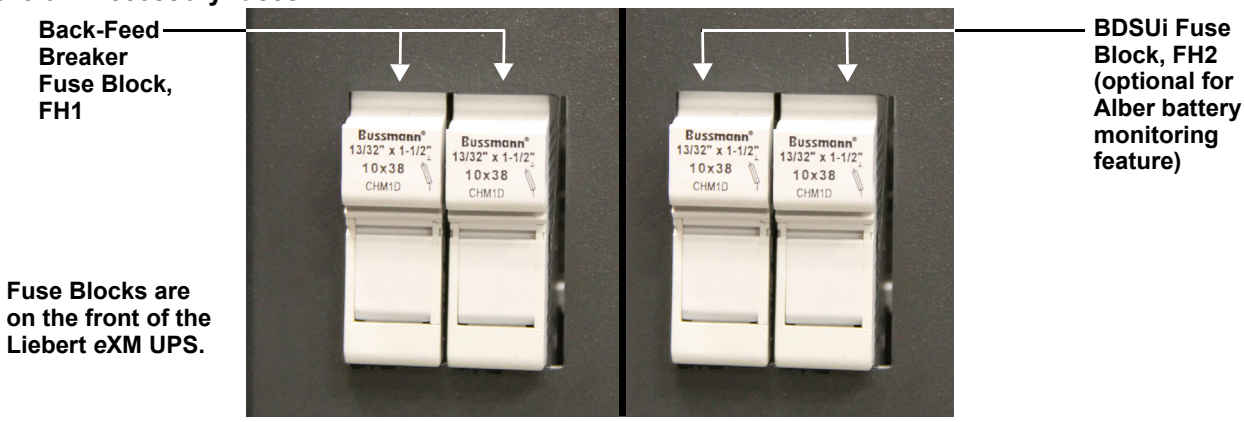
From	To
Liebert *e*XM UPS Bypass Module (X9 J23, J24 and J26)	**Liebert *e*XM BDC Terminal Strip (TB1)**
J24-3	TB1-7
FH1-B	TB1-8
J26-15	TB1-6
J26-13	TB1-5
J26-11	TB1-4
J26-9	TB1-3
J23-4	TB1-11
J23-6	TB1-12
FH1-N	J24-1

Refer to **Figure 3** for the location of fuse block FH1 and to **Figure 11** for the location of J23, J24 and J26

1.4.4 Accessory Fuses and Back-Feed Breaker Wiring

The back-feed breaker fuse block provides power to trip the BIB breaker. It is at the lower right of the input/output panel on the front of the Liebert *e*XM UPS. See **Figure 3** for fuse block locations.

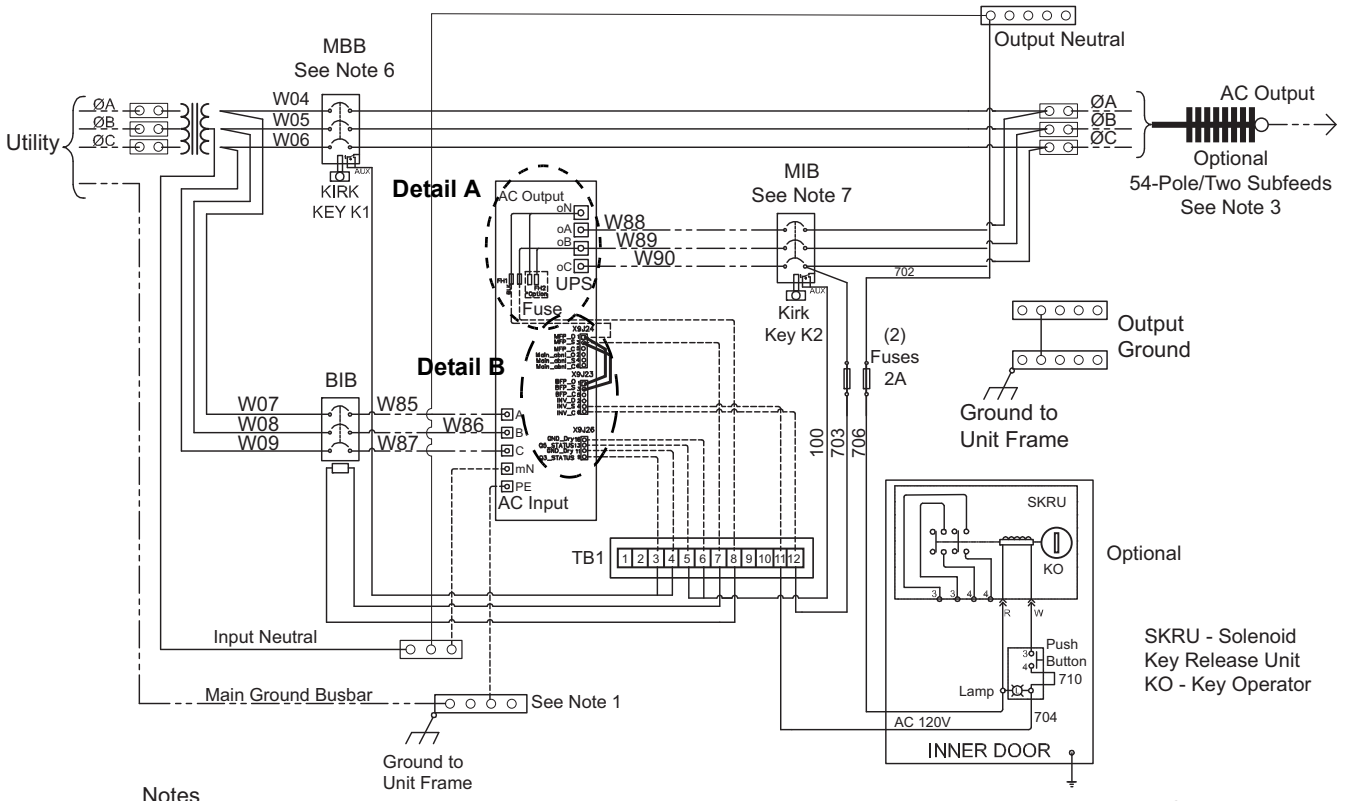
Figure 3 Accessory fuses


Back-Feed Breaker Fuse Block, FH1
BDSUi Fuse Block, FH2 (optional for Alber battery monitoring feature)
Fuse Blocks are on the front of the Liebert eXM UPS.
Bussmann 13/32" x 1-1/2" 10x38 CHM1D
Bussmann 13/32" x 1-1/2" 10x38 CHM1D
Bussmann 13/32" x 1-1/2" 10x38 CHM1D
Bussmann 13/32" x 1-1/2" 10x38 CHM1D

The back-feed breaker fuse block provides 120V and is connected to the UPS output (L-N). The fuse is rated for 8A. **Figures 4**, **5** and **6** show the back-feed breaker wiring; the connections are made to the static bypass assembly as shown in **Table 1**.

For additional details about the FH1 fuse block refer to the Liebert *e*XM UPS manuals, SL-25648 and SL-25650. The manuals ship with the UPS and are available at Liebert's Web site: **www.liebert.com**

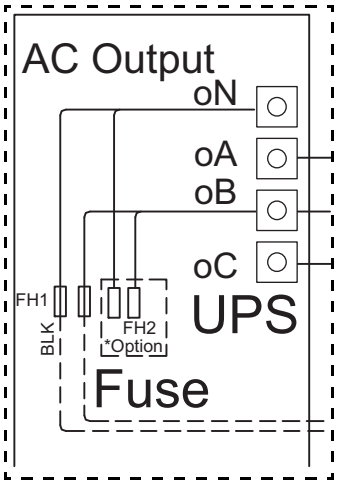
Figure 4 Liebert eXM BDC with distribution, single input



Notes

1. Customer-furnished electrode conductor must be installed in accordance with national and local electrical codes.
2. See installation manual for additional connection information.
3. Optional 54-pole, 225A for 10-40kVA frame only or optional 54 pole, 400A for 60-100kVA frame only. Or two 225A subfeeds for 60-100kVA only
4. Optional transformer: 208/220/480/600V input.
5. Overcurrent protection is based on 80% rated devices.
6. MBB auxiliary switch connections are on the normally closed and common positions.
7. MIB auxiliary switch connections are on the normally opened and common positions.
8. When the Liebert BDC is connected to UPS module, all control and power wiring is supplied by Emerson. When the Liebert BDC is remote from the UPS module, the cables between the Liebert BDC and UPS module must be supplied by others.

Detail A



Detail B

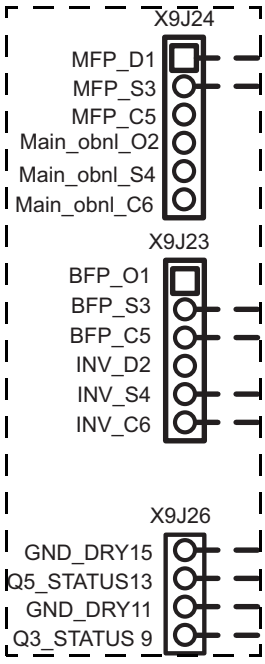
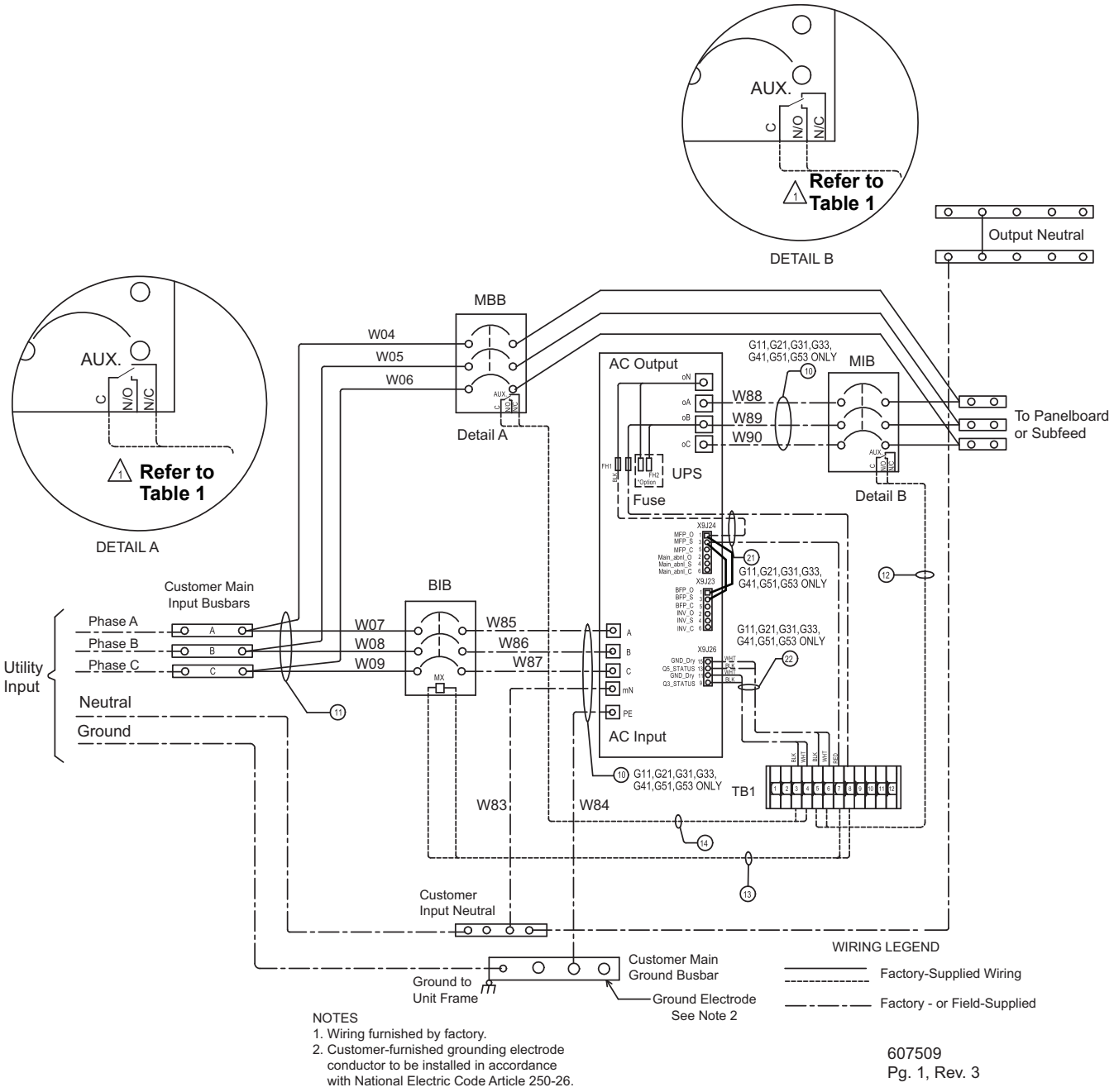


Figure 5 Liebert *e*XM BDC wiring, without transformer option, single input



NOTES
1. Wiring furnished by factory.
2. Customer-furnished grounding electrode conductor to be installed in accordance with National Electric Code Article 250-26.

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Figure 6 Liebert eXM BDC wiring with transformer option, single input

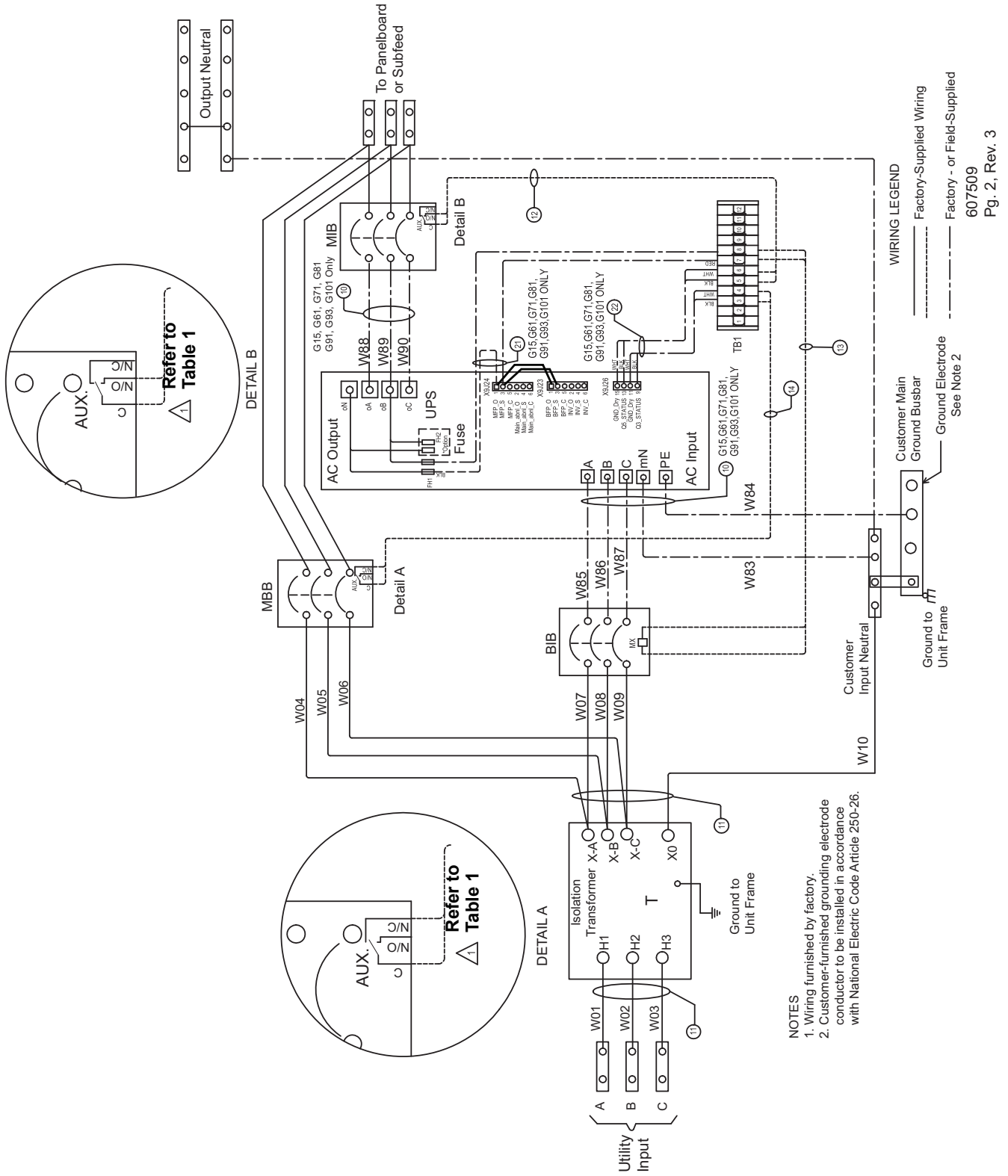


Figure 7 Wiring for LDMF with panelboard

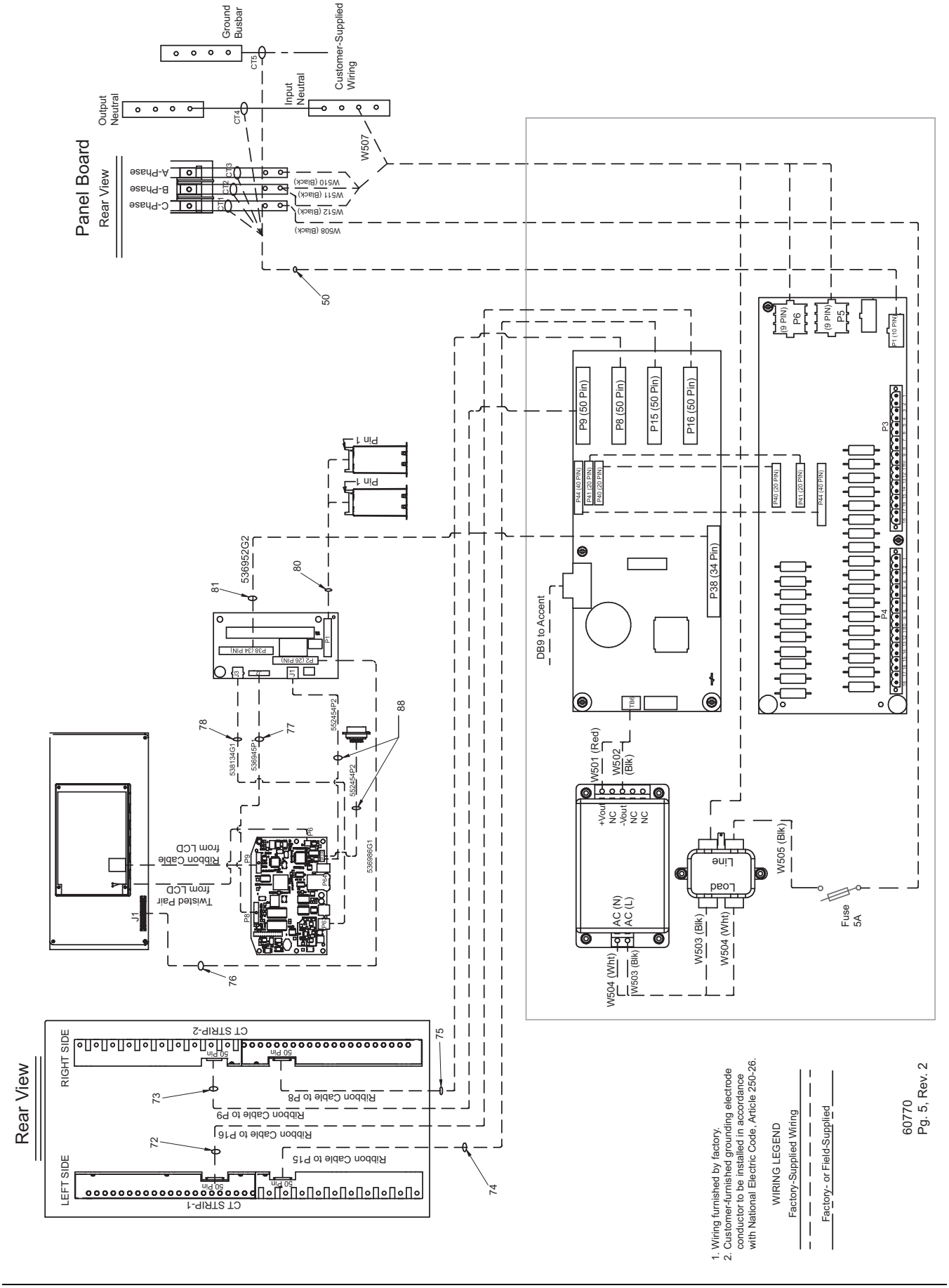
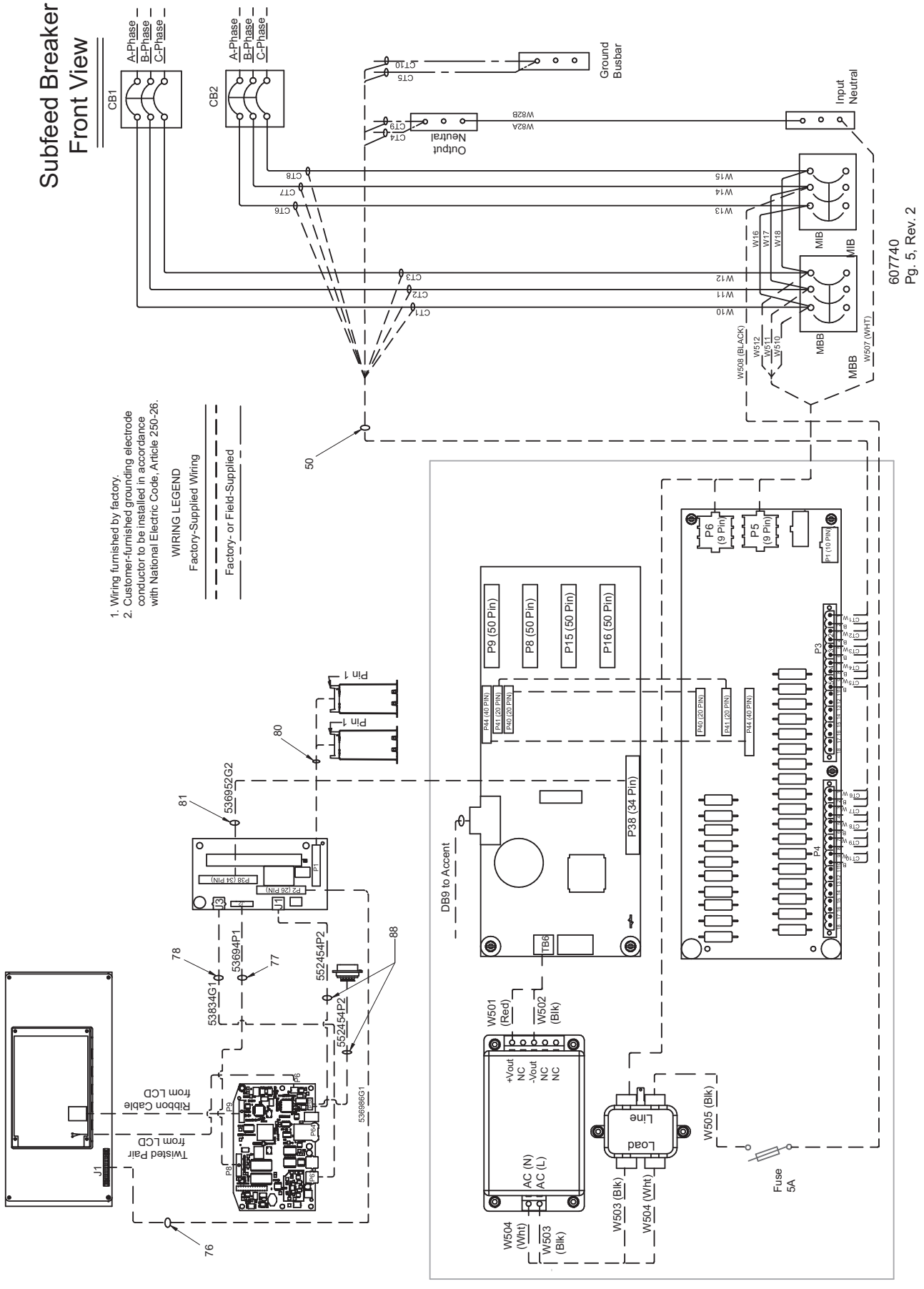


Figure 8 Wiring for LDMF with subfeed breakers

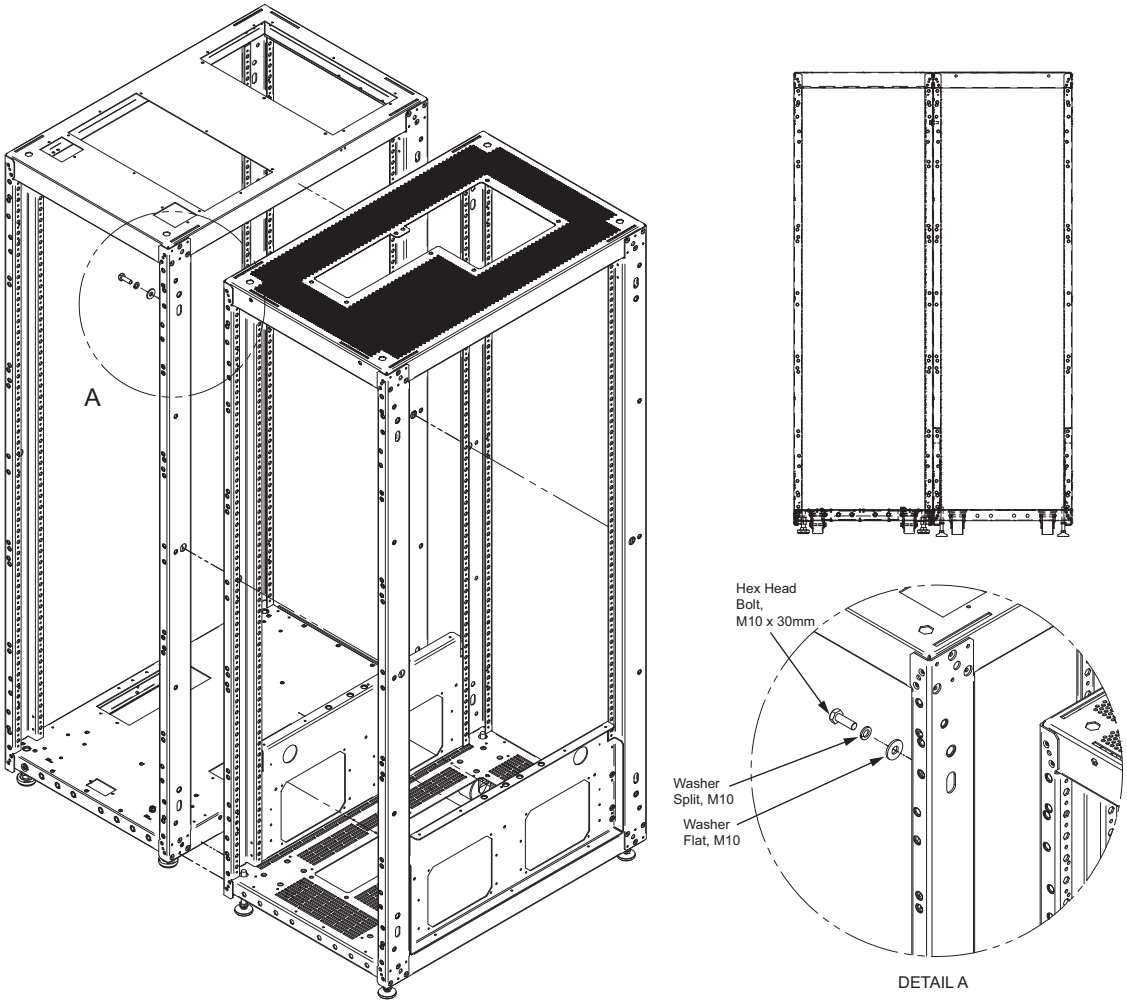


1.5 Bolting Cabinets Together

NOTE
UPS wiring must be completed before the cabinets are bolted together.

1. Line up cabinets so that mounting holes are aligned.

Figure 9 Bolting Liebert *e*XM UPS to a Liebert *e*XM BDC



**Place cabinets so mounting holes are aligned.
A bolt from the adjacent cabinet may be screwed into the threaded top hole, or a bolt may be inserted through the lower hole and screwed into the threaded hole in the adjacent cabinet.**

2. Using supplied hardware, bolt the cabinets together. The bolts may be inserted from either the UPS side or from the Liebert *e*XM BDC side, whichever is more convenient.

WARNING

Risk of heavy units tipping over while being moved. Can cause property damage, injury and death.

The Liebert *e*XM BDC and battery cabinets must be properly prepared and secured for lifting. Improper lifting may cause the cabinets to fall, causing equipment damage, personal injury and death.

Emerson recommends lifting the units with one of the following methods:

- Installing four eyebolts in the factory-fabricated holes, one at each corner of the unit, attaching cables or similar strapping to the eyebolts and lifting with a suitable mechanism.
- Placing suitable straps on the Liebert *e*XM BDC or battery cabinet. The straps must go under the unit to be lifted.

AVERTISSEMENT

Le centre de gravité élevé des appareils présente un risque de renversement lors des déplacements, pouvant entraîner des dommages matériels, des blessures et même la mort.

Les armoires Liebert *e*XM BDC et de batterie doivent être correctement préparées et sécurisées avant d'être levées. Un mauvais levage peut faire tomber les armoires, causant des dommages à l'équipement, des blessures, voire la mort.

Emerson recommande de soulever les unités en suivant l'une des méthodes suivantes :

- En installant quatre anneaux de levage dans les ouvertures fabriquées en usine, avec un anneau dans chaque coin de l'appareil, pour ensuite fixer les câbles ou sangles aux anneaux afin d'effectuer le levage à l'aide d'un mécanisme approprié.
- En plaçant des sangles convenables sur l'armoire Liebert ou de batterie. Les sangles doivent passer sous l'unité à soulever.

1.5.1 Floor Installation

If the Liebert *e*XM BDC is to be placed on a raised floor, the UPS should be mounted on a pedestal that will support the equipment point loading. Refer to the Liebert *e*XM UPS manual, SL-25648 or SL-25650, to design this pedestal.

1.5.2 Cable Entry

Cables can enter the Liebert *e*XM BDC from the top or bottom through removable metal plates.

Some plates have factory-punched holes and others are designed to allow the personnel to punch holes for fitting and securing the conduit. Once the conduit holes are punched, these plates should be reattached to the UPS. The conduit size and wiring method must be in accordance with all local, regional and national codes and regulations, including NEC ANSI/NFPA 70.

NOTE

When installing the UPS, the customer must provide a disconnect with overcurrent protection at the output of the UPS.

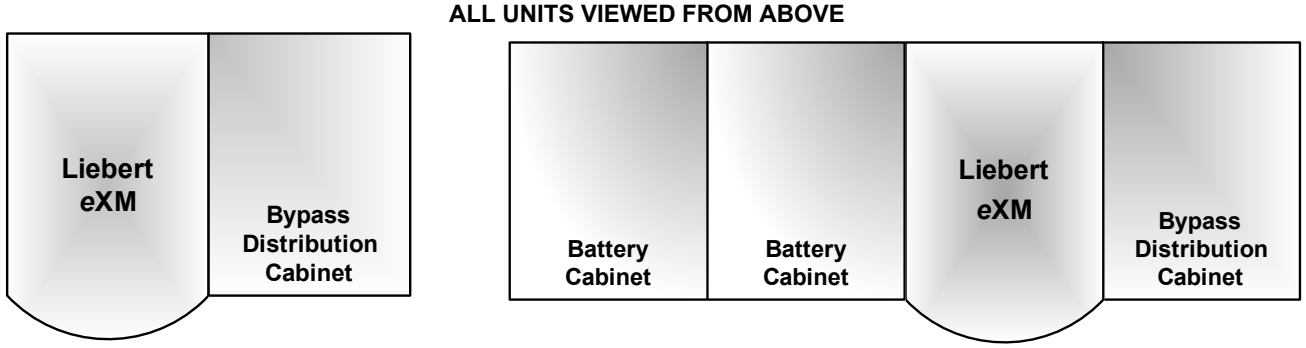
1.5.3 Optional Cabinets

The Liebert *e*XM BDC must be bolted to right side of the Liebert *e*XM (see **Figure 10**).

The Liebert *e*XM BDC must be cabled and bolted to the Liebert *e*XM **before** the UPS and bypass distribution cabinet are moved into their final position. Connect input wiring to the Liebert *e*XM BDC ONLY after the units are internally cabled and positioned.

Battery cabinets may be bolted only to the left side of the Liebert *e*XM; see **Figure 10**.

Figure 10 Cabinet arrangement

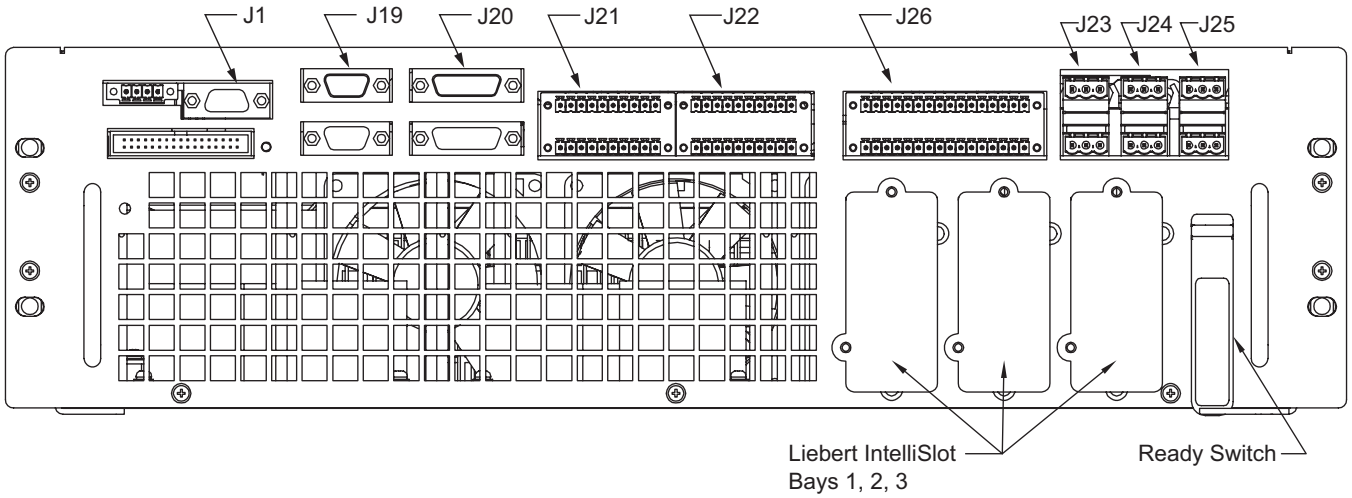


Liebert *e*XM UPS connected only to Liebert *e*XM BDC (The Liebert *e*XM BDC must be on right side of the Liebert *e*XM UPS)

Liebert *e*XM UPS connected to Liebert eXM BDC and Battery Cabinets (BDC must be on right side of the Liebert *e*XM) (Battery Cabinets must be on the left side of the Liebert *e*XM UPS)

1.6 Liebert *e*XM UPS Bypass Assembly

Figure 11 Liebert *e*XM UPS bypass assembly connections



The Static bypass assembly has three Liebert IntelliSlot interface card bays and connections for ancillary cabinets (Liebert *e*XM BDC and battery) and for options.

1.6.1 Liebert *e*XM BDC Interface

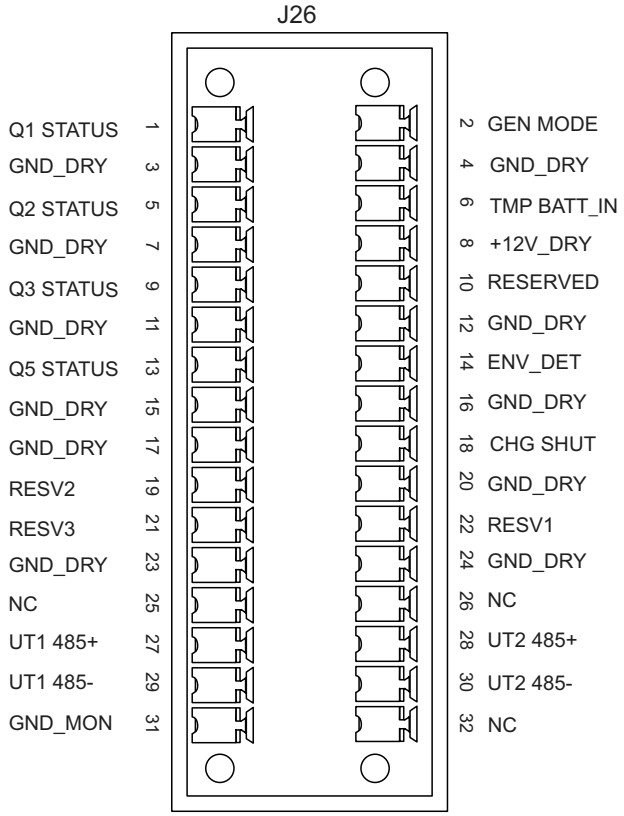
The Liebert *e*XM BDC interface is on the Auxiliary Terminal Block at J26. Refer to **Figure 12** for circuit details.

Table 2 Liebert *e*XM BDC interface

Position	Name	Description
J26.1	Q1 STA	Main input switch status signal
J26.5	Q2 STA	Bypass input switch status signal
J26.9	Q3 STA	External maintenance switch status signal
J26, 3, 7, 9	GND	Ground for dry contacts

These contacts cannot be active unless they are set via software.

Figure 12 Input dry contacts—J26



NOTE

All auxiliary cables of terminal must be double-insulated. Wire should be 20-16AWG stranded for maximum runs between 80 and 200 feet (25-60m), respectively.

NOTE

Refer to ***Table 1*** *and* ***Figure 4*** *for the Liebert* e*XM BDC wiring.*

Figure 13 Output dry contacts and EPO wiring

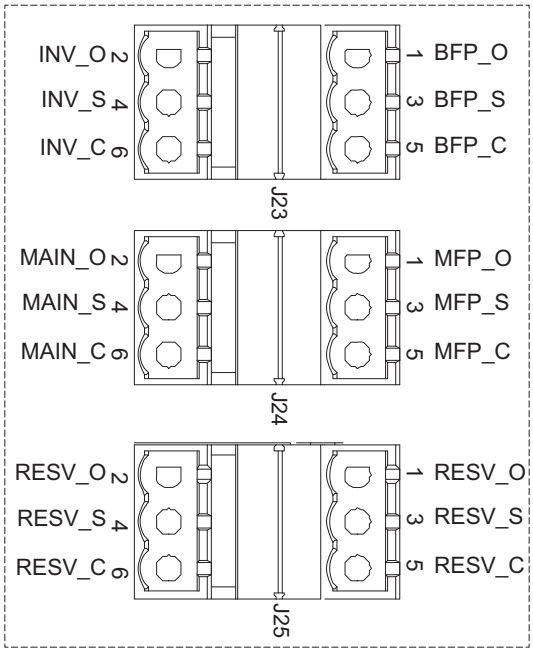


Table 3 Output dry contact relays

Port	Pin	Name	Description
J24	1	MFP_O	Rectifier back-feed normally open contact. Open when there is no back-feed.
	3	MFP_S	Rectifier back-feed common contact.
	5	MFP_C	Rectifier back-feed normally closed contact. Closed when there is no back-feed.
J23	2	INV_O	Inverter state normally open contact. Open when the inverter is abnormal.
	4	INV_S	Inverter state common contact.
	6	INV_C	Inverter state normally open contact. Closed when the inverter is normal.
J23	1	BFP_O	Bypass back-feed normally open contact. Open when there is no back-feed.
	3	BFP_S	Bypass back-feed common contact.
	5	BFP_C	Bypass back-feed normally closed contact. Closed when there is no back-feed.
J24	2	MAIN_O	Rectifier input state normally open contact. Open when the rectifier is abnormal.
	4	MAIN_S	Rectifier input state common contact.
	6	MAIN_C	Rectifier input state normally closed contact. Closed when the rectifier is normal.

2.0 INSTALLATION DRAWINGS

Figure 14 Liebert *e*XM BDC with 225A or 400A panelboards—Main components

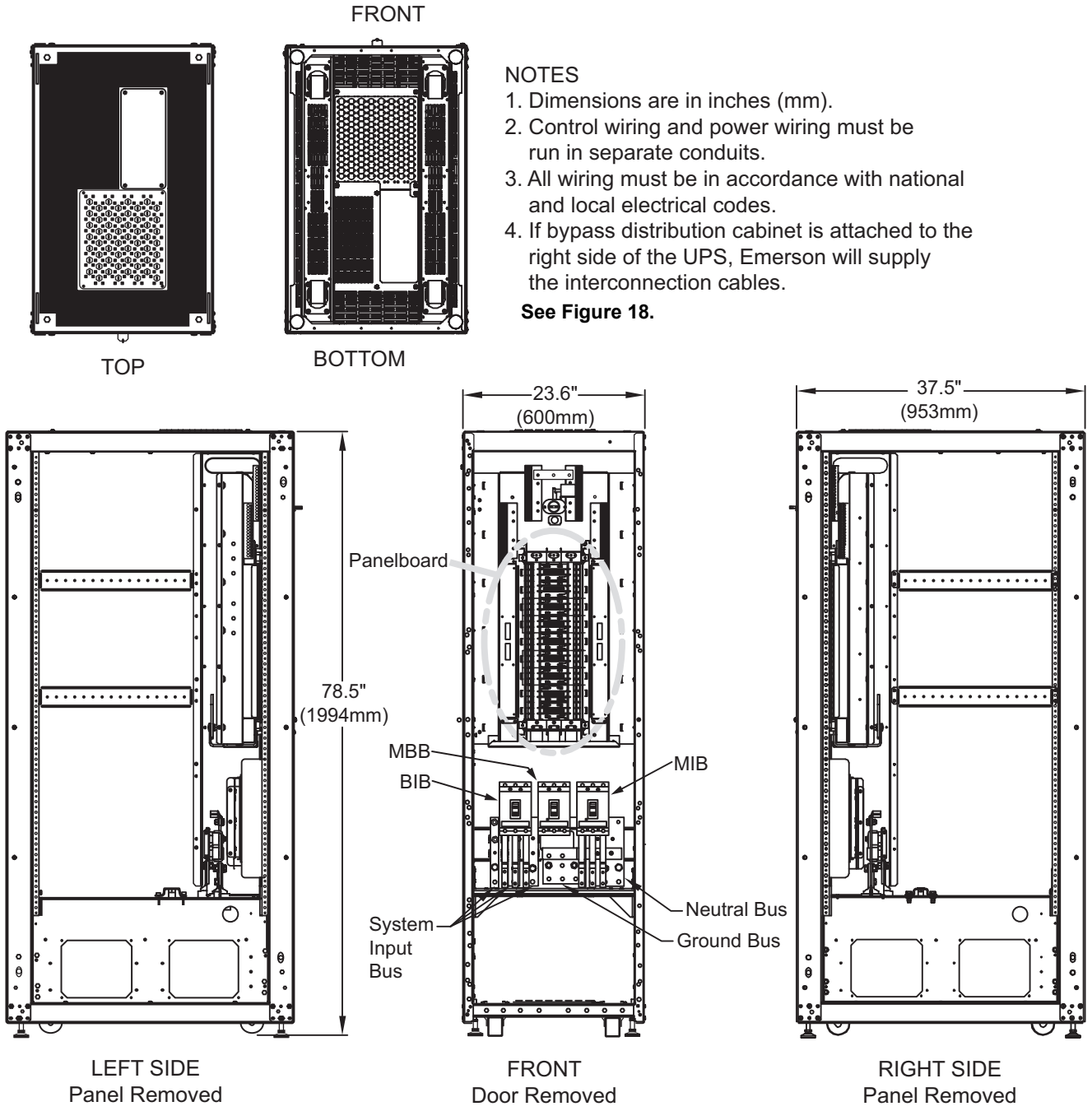
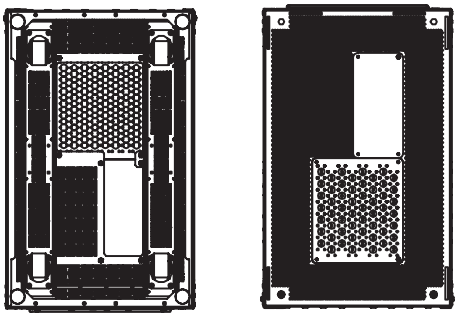
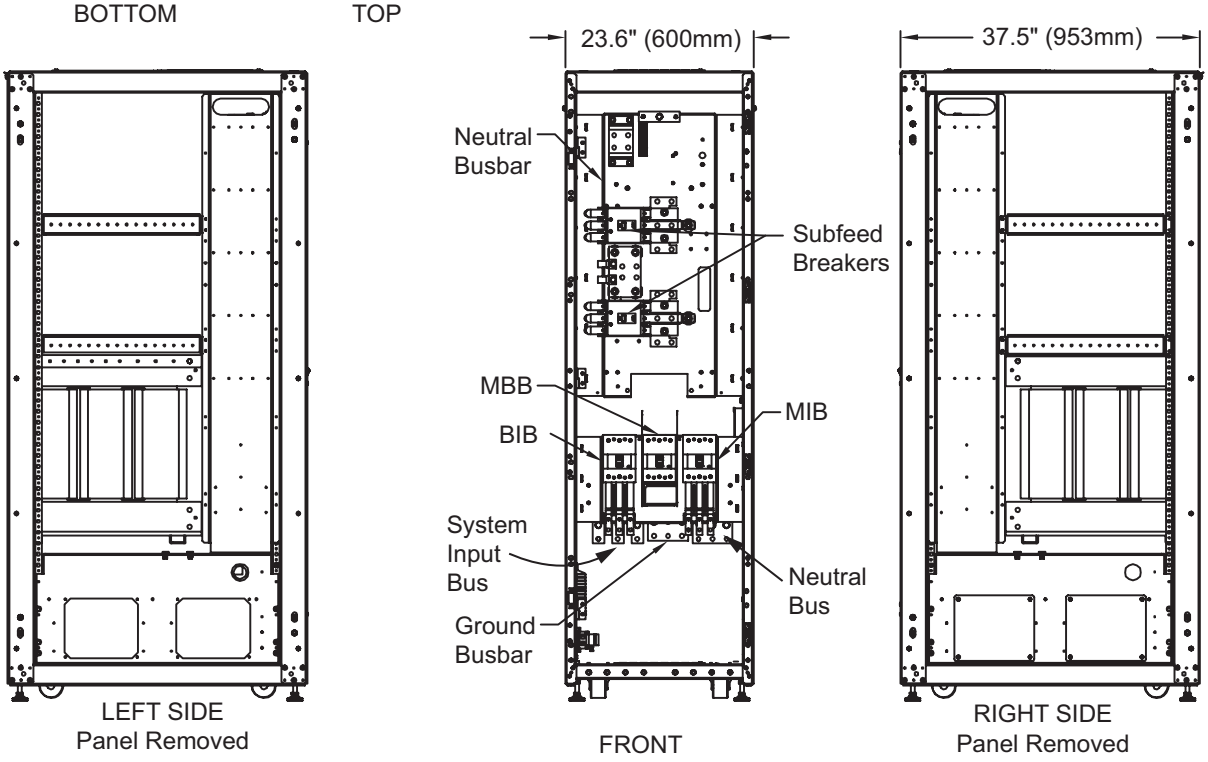


Figure 15 Liebert *e*XM BDC with two subfeed breakers—Main components



BOTTOM TOP

NOTES
1. All dimensions are in inches (mm).
2. Control wiring and power wiring must be run in separate conduits.
3. Copper cables only are recommended.
4. All wiring is to be in accordance with national and local electrical codes.
5. When the Liebert *e*XM BDC is attached to the UPS, Emerson will supply the interconnection cables.
6. 225A panelboard for 10k-40kVA only. 400A panelboard for 60-100kVA only



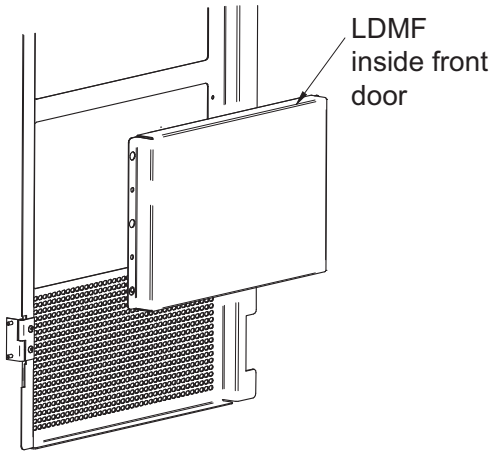


Figure 16 Liebert *e*XM BDC with optional SKRU and transformer

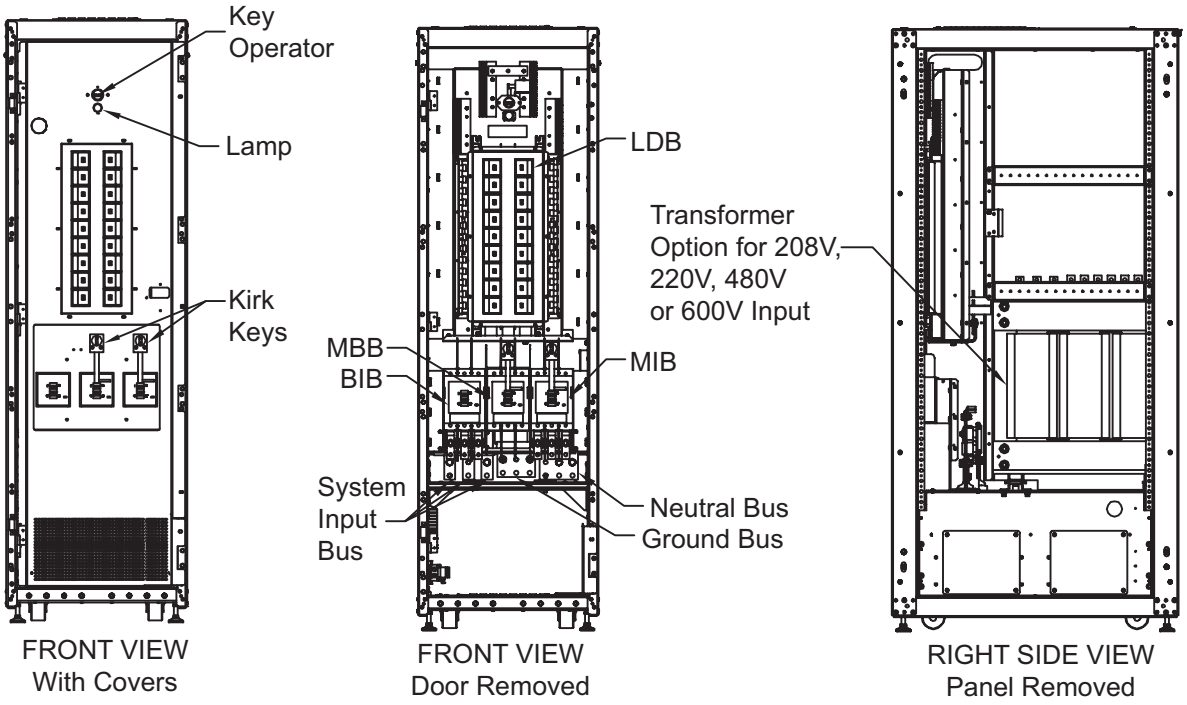
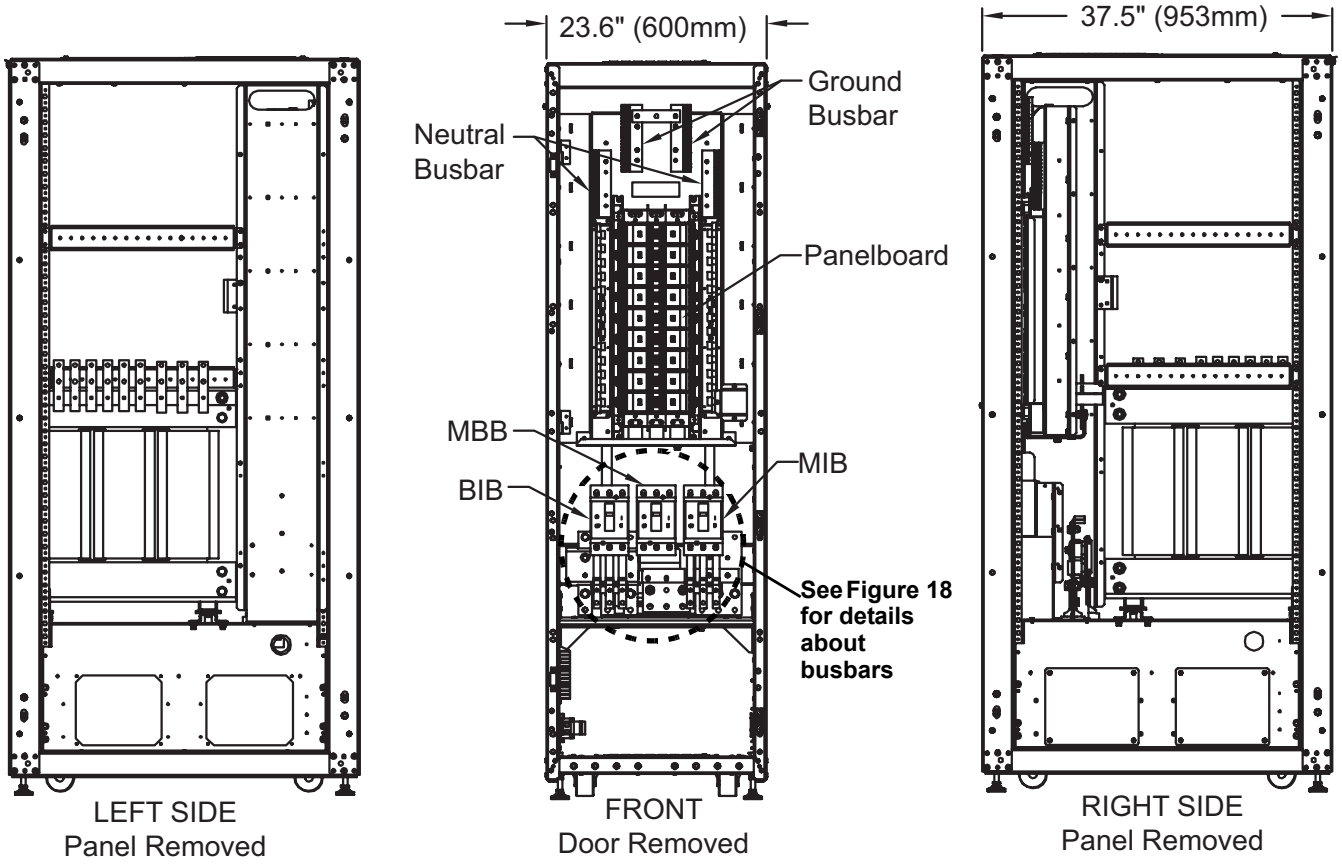


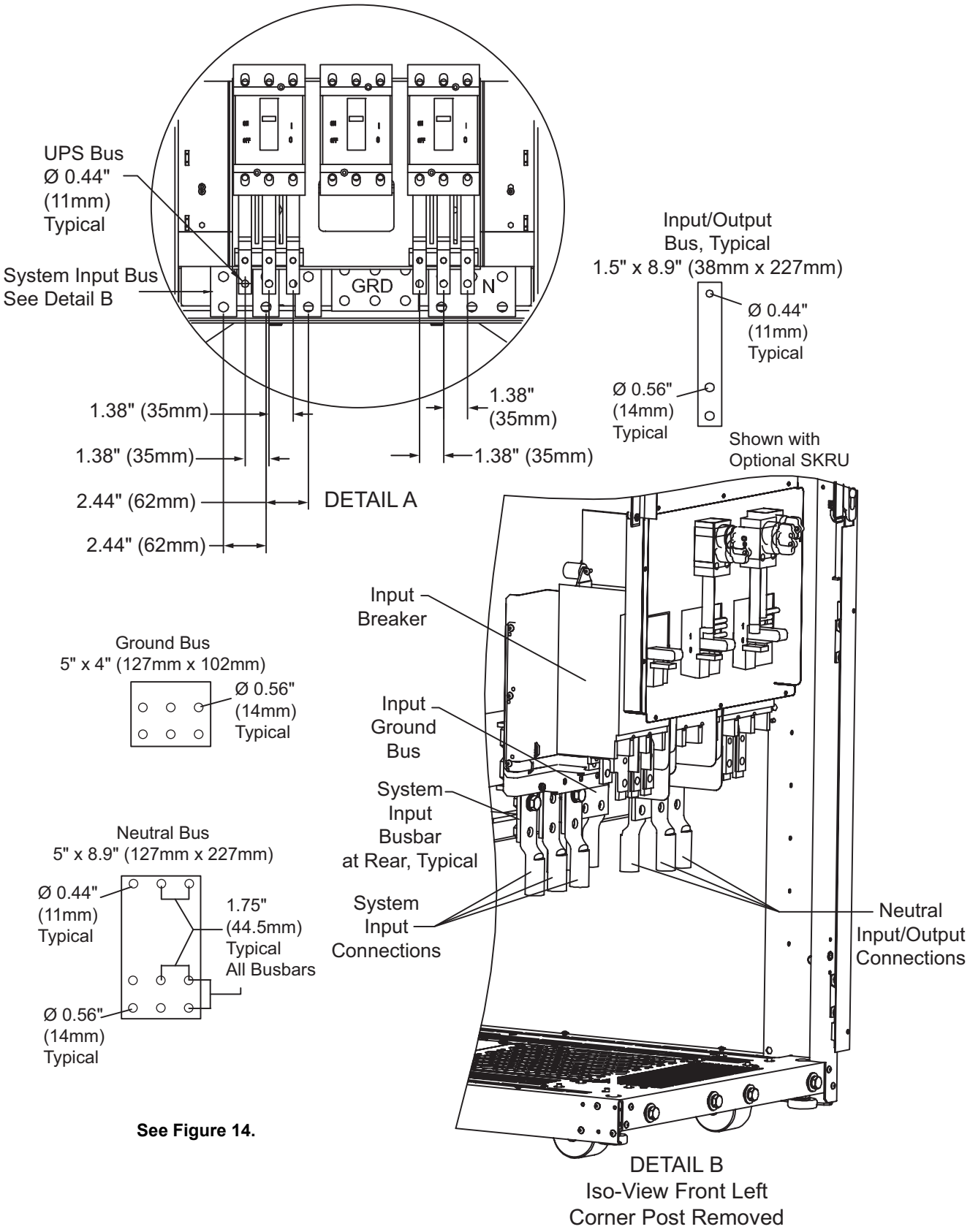
Figure 17 Busbars—Liebert *e*XM BDC with panelboard



Notes:

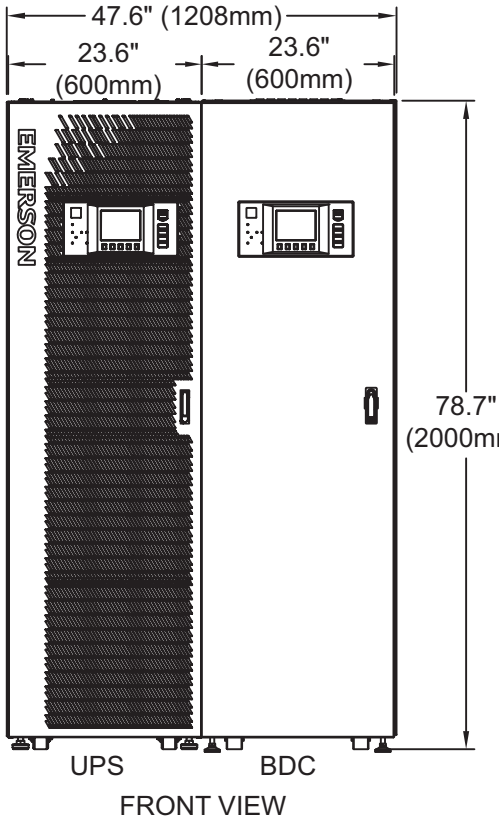
1. All dimensions are in inches (mm).
2. Control wiring and power wiring must be run in separate conduits.
3. All wiring is to be in accordance with national and local electrical codes.
4. Emerson will supply the interconnection cables when the Liebert *e*XM BDC is attached to the UPS.
5. 225A panelboard for 10k-40kVA only. 400A panelboard for 60-100kVA only.

Figure 18 Busbars—Liebert *e*XM BDC



See Figure 14.

Figure 19 Lineup arrangement, Liebert *e*XM with Liebert *e*XM BDC



NOTES
1. Dimensions are in inches (mm).
2. 24" (610mm) minimum clearance above unit.
   36" (914mm) front access required for service.
   For seismic mounting only 5" (102mm) in rear for mounting brackets
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
   Remove, punch to suit conduit size and replace.
5. Unit bottom is structurally adequate for forklift handling.
6. Control wiring and power wiring must be run in separate conduits.
7. All wiring is to be in accordance with national and local electrical codes.
8. Bypass distribution cabinet must be positioned on the right side of the UPS.

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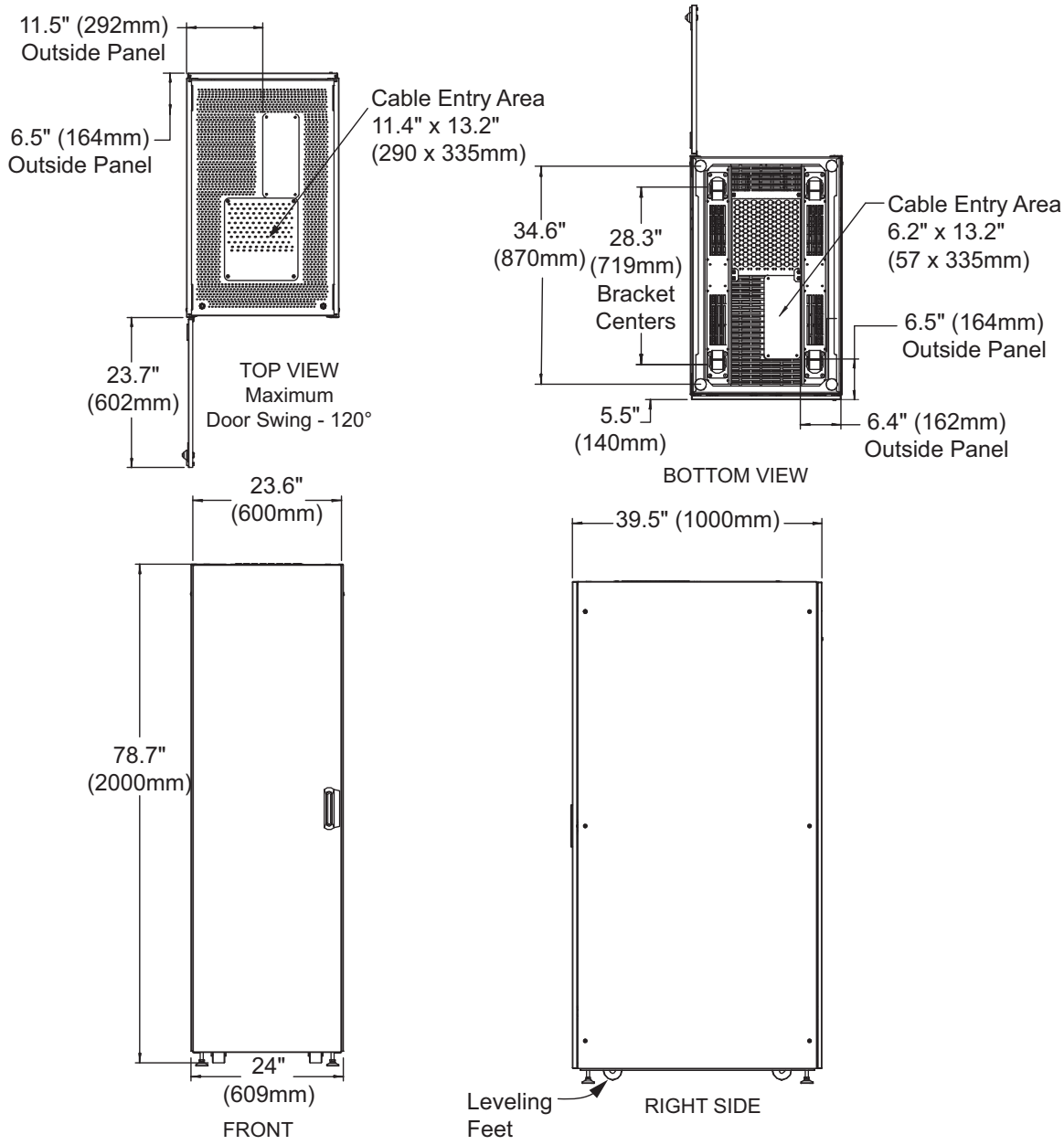
Figure 20 Outline drawing, Liebert *e*XM BDC for Liebert *e*XM, 10-100kVA



1. All dimensions are in inches (mm).
2. 24" (610) minimum clearance above unit; 36" (914) front access required for service.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates. Remove, punch to suit conduit size and replace.
5. Control wiring and power wiring must be run in separate conduits.
6. All wiring is to be in accordance with national and local electrical codes.

Figure 21 Liebert *e*XM BDC transformer location

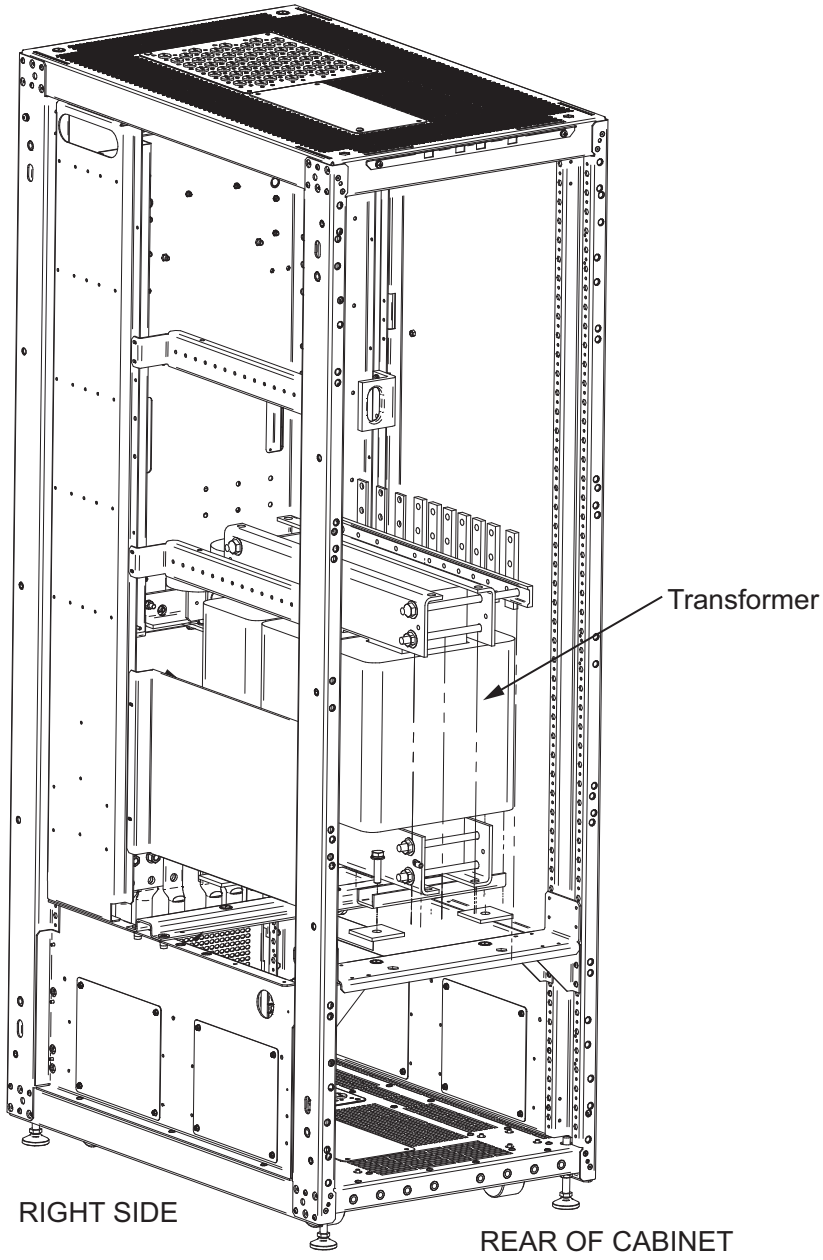


Table 4 Wiring for Liebert *e*XM to Liebert *e*XM BDC

Run	From	To	Conductors
A	Utility AC source	BDC System Input Bus	Phase A, B, C
B	Utility AC Source	BDC System Input Bus	Neutral
C	BDC Bypass Isolation Breaker	UPS Main Input	Phase A, B, C
D	BDC Bypass Isolation Breaker	UPS Main Input	Neutral
E	UPS Output	Liebert *e*XM BDC Maintenance Isolation Breaker	Phase A, B, C
F	UPS Output	Liebert *e*XM BDC Maintenance Isolation Breaker	Neutral
G	BDC Panelboard	Load AC Connection	Phase A, B, C
H	BDC Panelboard	Load AC Connection	Neutral
I	Utility AC Source	All Ground Connections	Ground
J	BDC Terminal Block TB1	UPS Static Bypass Module J23, J24 and J26	Wiring for KO on Liebert *e*XM BDC

See **Figure 4** and **Table 1** for additional details.

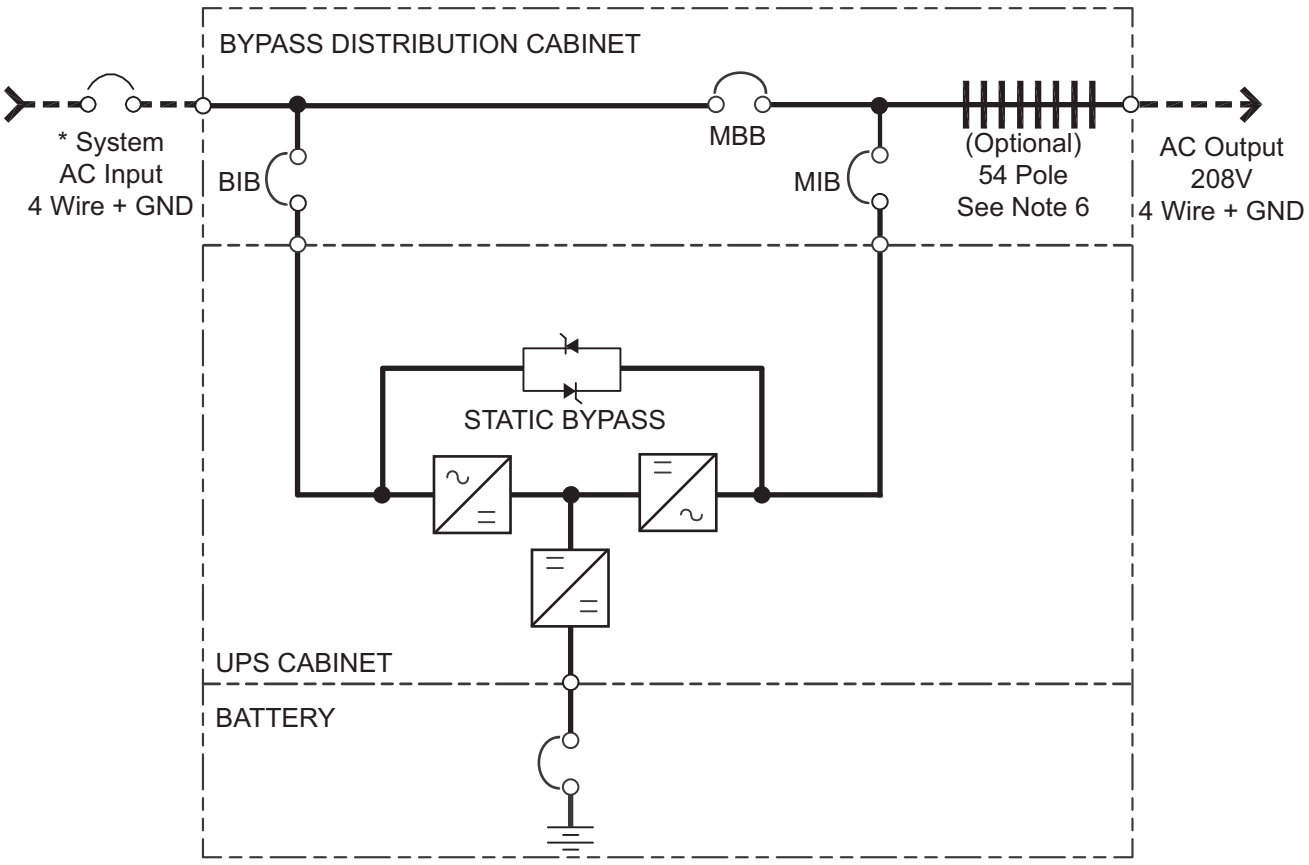
NOTE

Interconnection wiring between the UPS and bypass distribution cabinet is supplied by Emerson when the Liebert eXM BDC and Liebert eXM UPS are ordered as a system.

Table 5 Hardware torque values

Hardware	Two Belleville Washers
M10 (3/8")	240 lb-in. (27 Nm)
M12 (1/2")	428 lb-in (48Nm)

Figure 22 One-line diagram, 208V single input 10-100kVA UPS with three-breaker Liebert *e*XM BDC and panelboard

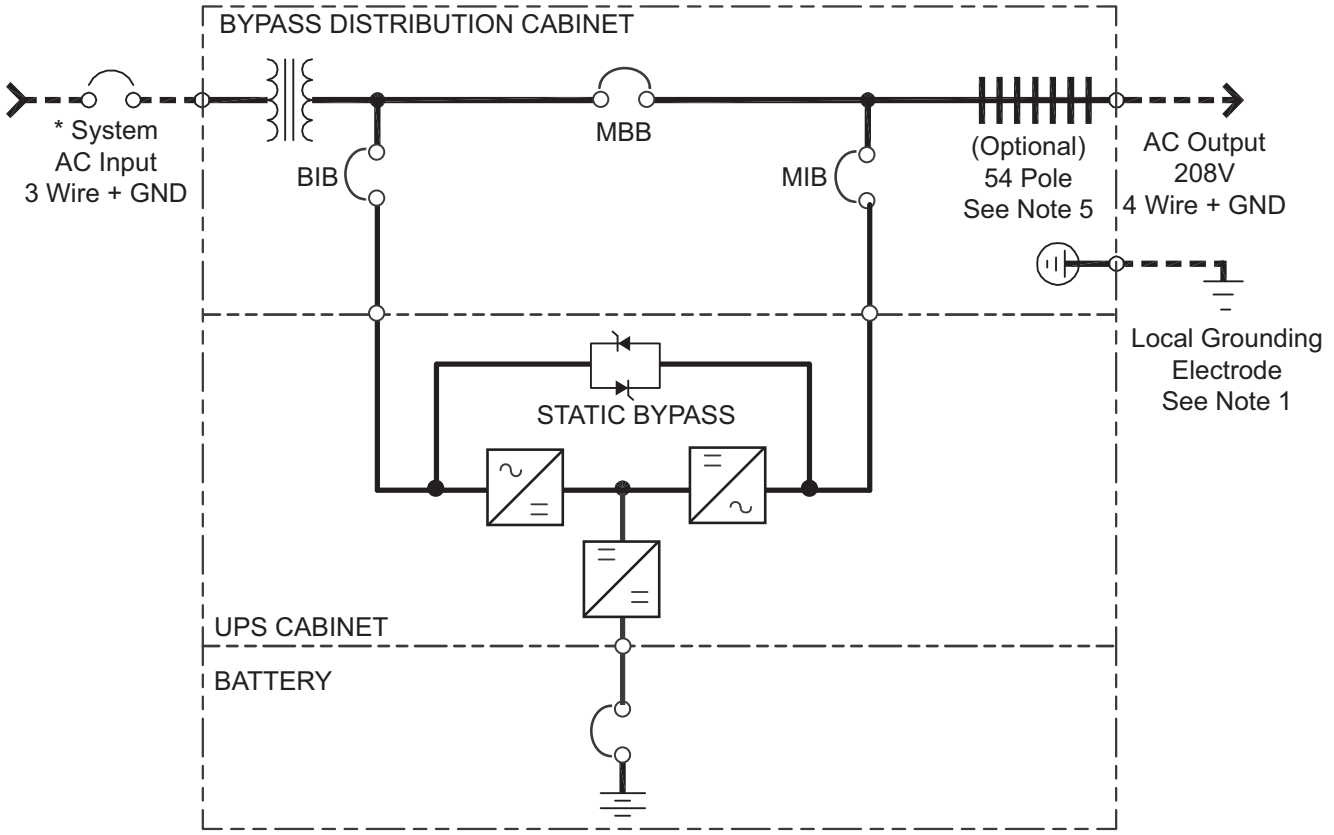


NOTES

1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. A neutral is required from the system AC input source.
4. UPS system input and output cables must be run in separate conduits.
5. Control wiring must be run in separate conduits.
6. Optional 54 pole, 225A for 10-40kVA frame only or optional 54 pole 400A for 60-100kVA frame only.

BIB - Bypass Isolation Breaker
MBB - Maintenance Bypass Breaker
MIB - Maintenance Isolation Breaker
* External Overcurrent Protection by Others
– – – – Field-Supplied Wiring

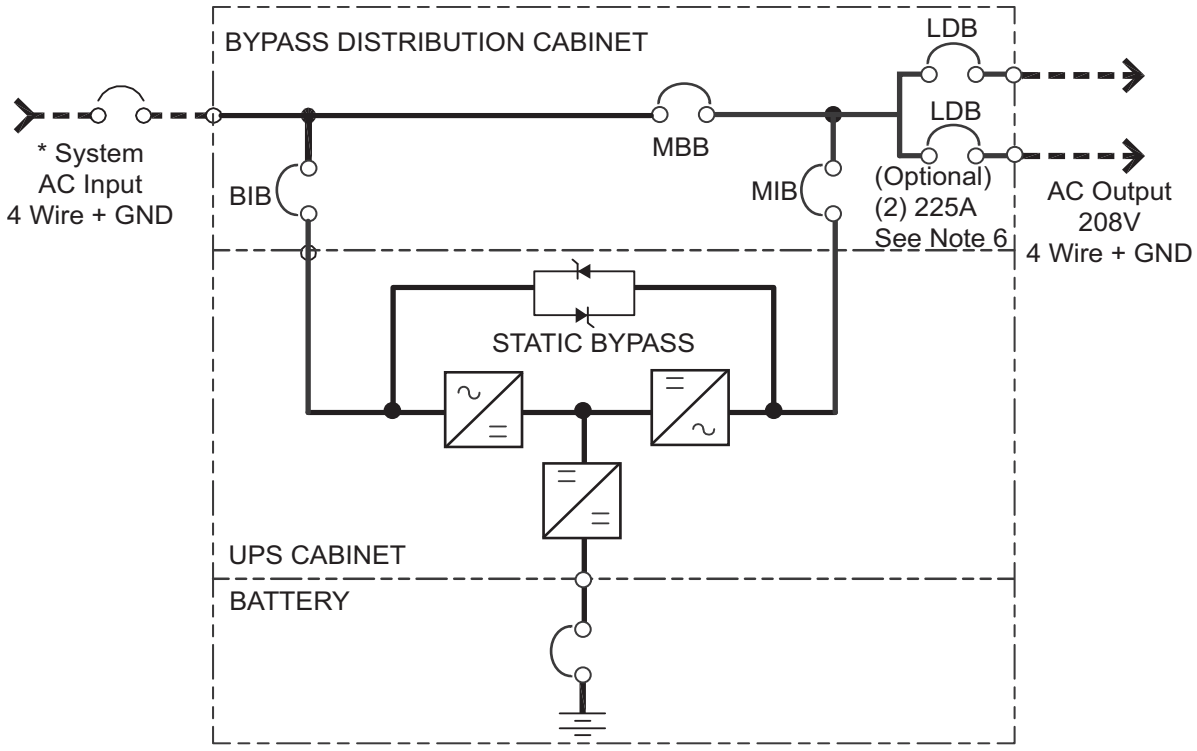
Figure 23 One-line diagram, 208V single input 10-100kVA UPS with three-breaker Liebert *e*XM BDC, input isolation transformer and panelboard



NOTES
1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. UPS system input and output cables must be run in separate conduits.
4. Control wiring must be run in separate conduits.
5. Optional 54-pole, 225A for 10-40kVA frame only or optional 54-pole 400A for 60-100kVA frame only.
6. Transformer available: 208, 220, 480, 600V input.

BIB - Bypass Isolation Breaker
MBB - Maintenance Bypass Breaker
MIB - Maintenance Isolation Breaker
* External Overcurrent Protection by Others
- - - - Field-Supplied Wiring

Figure 24 One-line diagram, 208V single input 10-100kVA UPS with three-breaker Liebert *e*XM BDC and two subfeed breakers

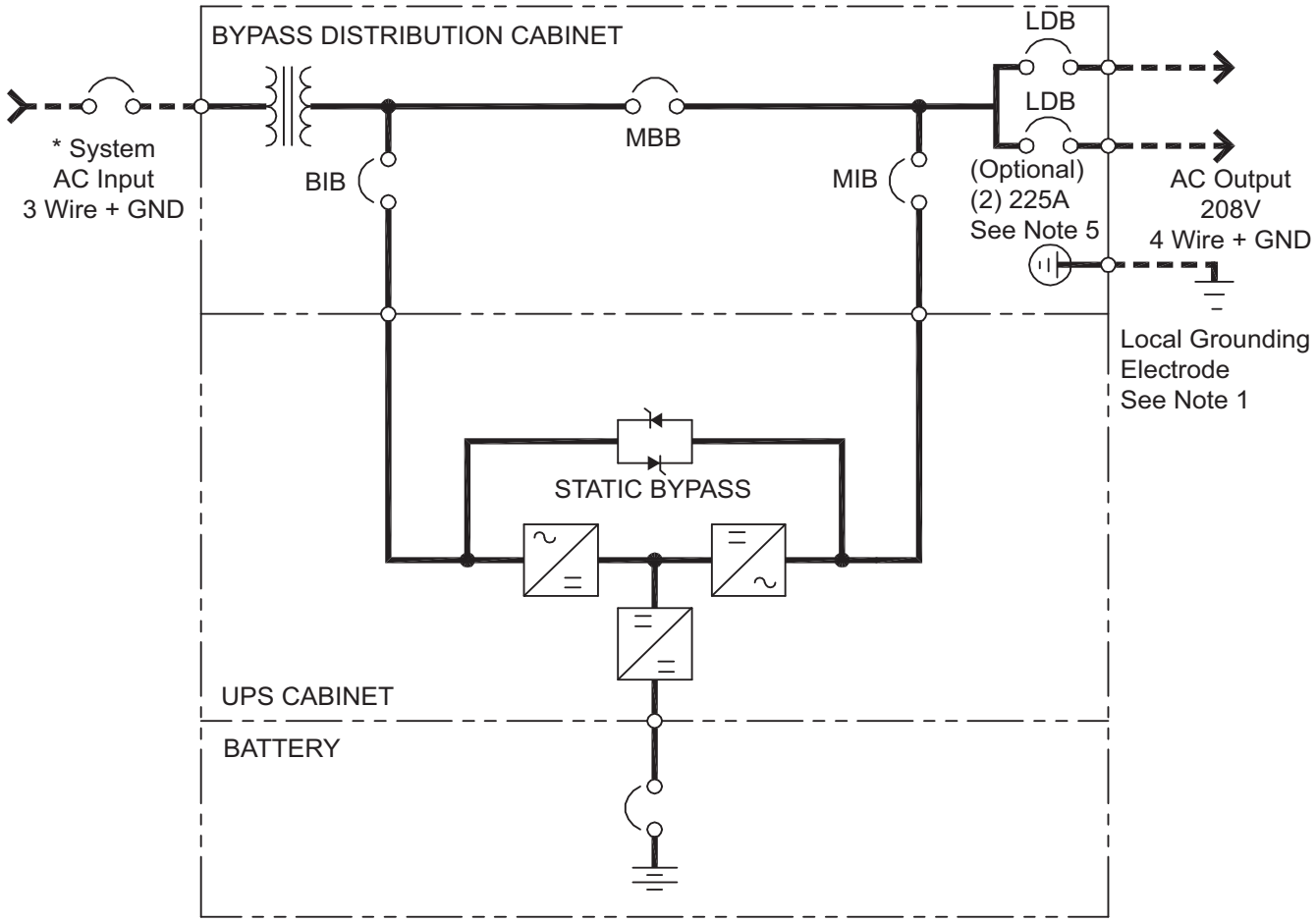


NOTES

1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. A neutral is required from the system AC input source. A full capacity neutral conductor is recommended. Grounding conductors are recommended.
4. UPS system input and output cables must be run in separate conduits.
5. Control wiring must be run in separate conduits.
6. Optional (2) 225A LDB for 60-100kVA frame only. Optional single 225A LDB for 10-40kVA frame.

LDB - Load Distribution Breaker
BIB - Bypass Isolation Breaker
MBB - Maintenance Bypass Breaker
MIB - Maintenance Isolation Breaker
* External Overcurrent Protection by Others
- - - - Field-Supplied Wiring

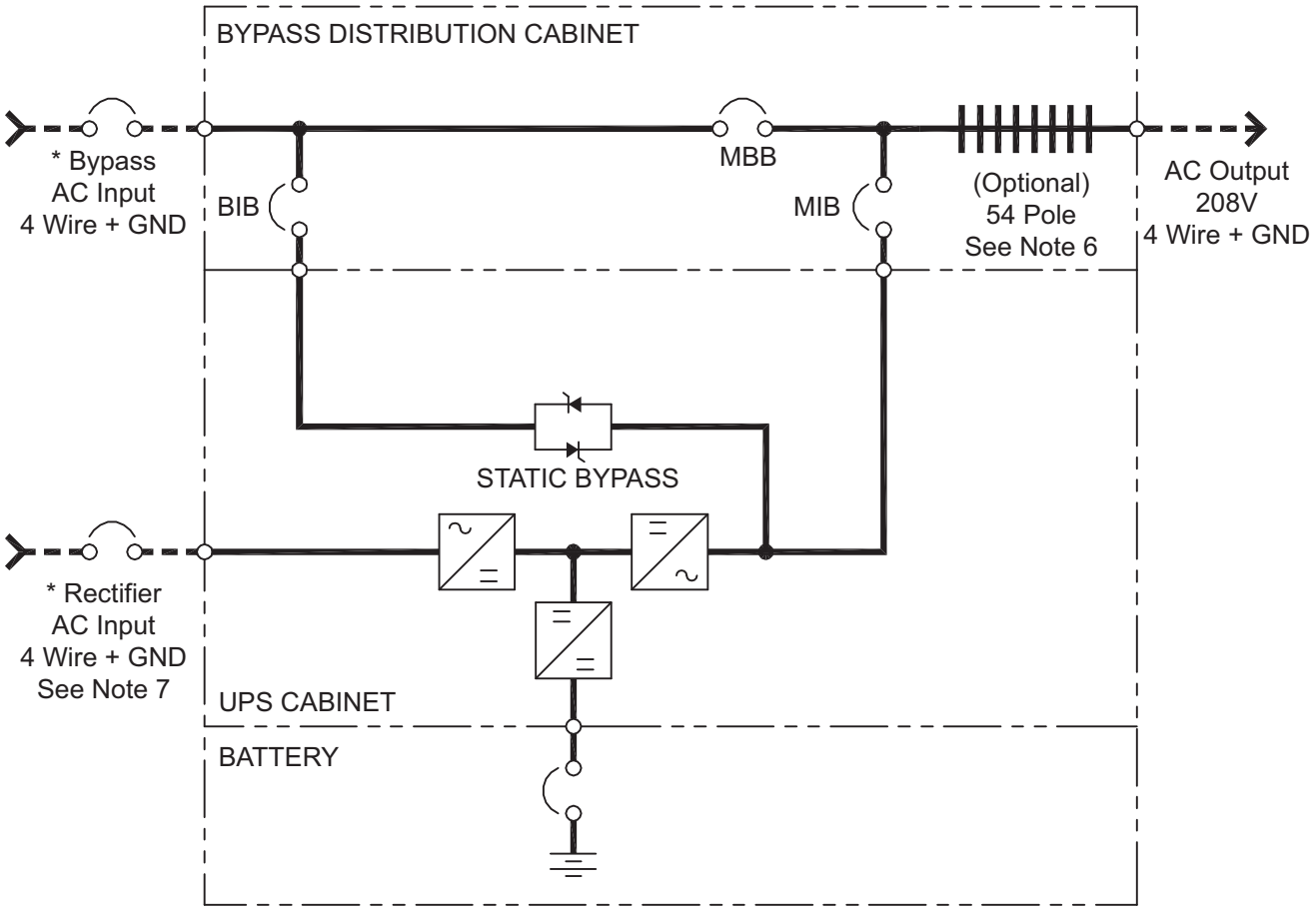
Figure 25 One-line diagram, 208V single input 60-100kVA UPS with three-breaker Liebert *e*XM BDC, input isolation transformer and two subfeed breakers



NOTES
1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. UPS system input and output cables must be run in separate conduits.
4. Control wiring must be run in separate conduits.
5. Optional (2) 225A LDB for 60-100kVA frame only. Optional single 225A LDB for 10-40kVA frame.
6. Transformer available: 208, 220, 480, 600V input.

LDB - Load Distribution Breaker
BIB - Bypass Isolation Breaker
MBB - Maintenance Bypass Breaker
MIB - Maintenance Isolation Breaker
* External Overcurrent Protection by Others
– – – – Field-Supplied Wiring

Figure 26 One-line diagram, 208V dual input 10-100kVA UPS with three-breaker Liebert eXM BDC and panelboard



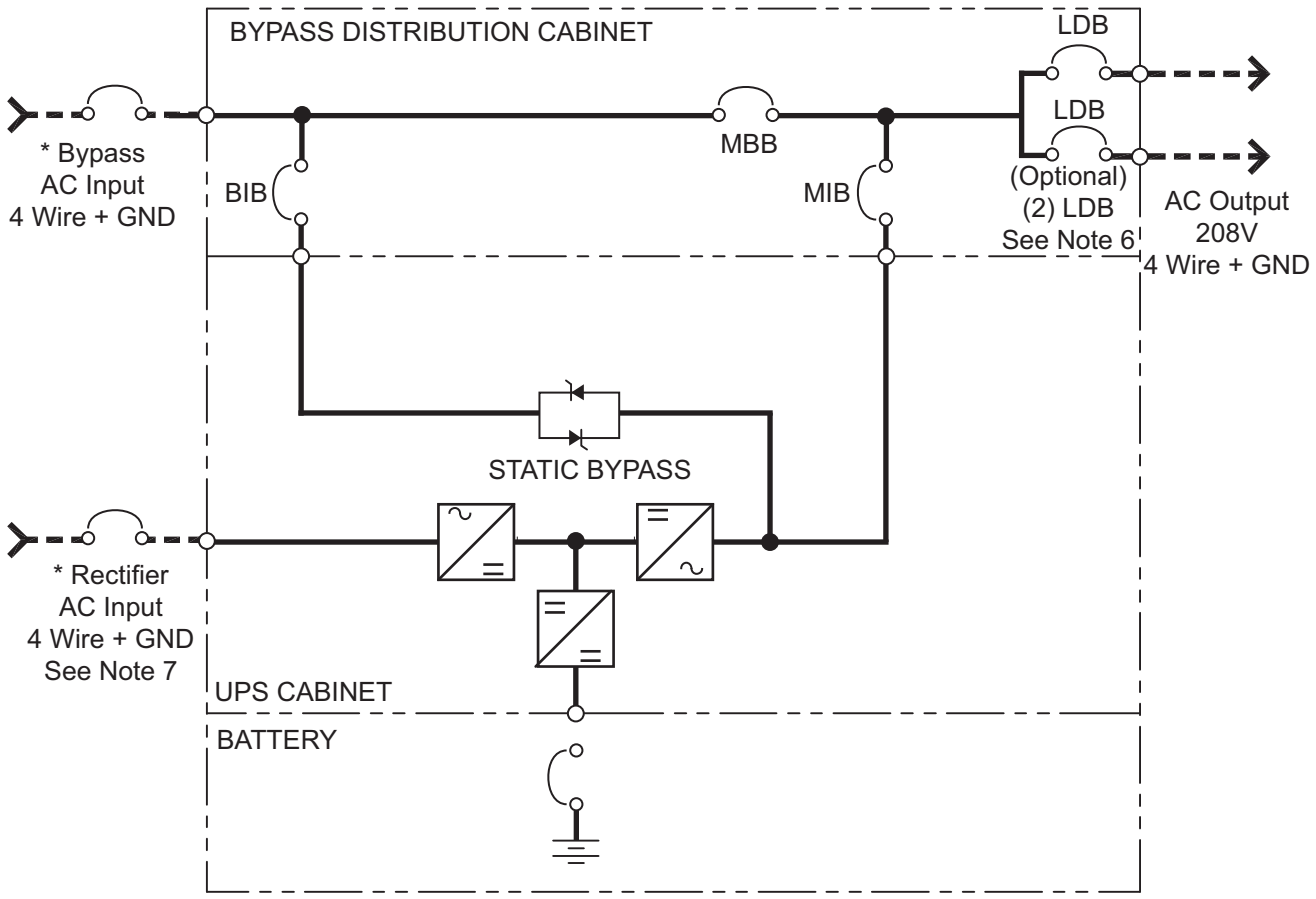
NOTES

1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. A neutral is required from the system AC input source. A full capacity neutral conductor is recommended.
4. Bypass and rectifier inputs and output cables must be run in separate conduits.
5. Control wiring must be run in separate conduits.
6. Optional 54-pole, 225A for 10-40kVA frame only or optional 54-pole 400A for 60-100kVA frame only.
7. Customer must supply shunt trip breaker with 120V coil.
8. Remove bypass jumper busbars inside the UPS to configure a dual input system.

BIB - Bypass Isolation Breaker
MBB - Maintenance Bypass Breaker
MIB - Maintenance Isolation Breaker
* External Overcurrent Protection by Others
– – – – Field-Supplied Wiring

See Tables 12 and 13 for details.

Figure 27 One-line diagram, 208V dual input 10-100kVA UPS with three-breaker Liebert eXM BDC and two subfeed breakers



Notes

1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. A neutral is required from the system AC input source. A full capacity neutral conductor is recommended. Grounding conuctors are recommended.
4. Bypass and rectifier inputs and output cables must be run in separate conduits.
5. Control wiring must be run in separate conduits.
6. Optional (2) 225A LDB for 60-100kVA frame only.
7. Customer must supply shunt trip breaker with 120V coil.
8. Remove bypass jumper busbars inside the UPS to configure a dual input system.

LDB - Load Distribution Breaker
BIB - Bypass Isolation Breaker
MBB - Maintenance Bypass Breaker
MIB - Maintenance Isolation Breaker
* External Overcurrent Protection By Others
– – – – Field-Supplied Wiring

See Tables 12 and 13 for details.

3.0 SPECIFICATIONS

Table 6 Physical standards and parameters

Bypass Distribution Cabinet Parameters	Values
Standard Color	Black (ZP-7021)
Front Door Opening (for serviceability)	More than 180°
Degree of Protection for UPS Enclosure	IP 20 (with and without front door open)
Minimum Clearance, Top	24" (610mm)
Minimum Clearance, Back	0" (5" [127mm] when seismic brackets are used)
Minimum Clearance, Sides	0"
Cable Entrance	Top or Bottom
Standards & Conformities	UL 71778 5th Ed.; CSA 22.2 107.3-14 FCC Part 15, Class A; ISTA Procedure 1H; WEEE; IBC 2012/CBC 2010
Environmental	
Storage Temperature Range, °F (°C)	-13°F to 158°F (-25°C to 70°C)
Operating Temperature Range, °F (°C)	32°F to 104°F (0 to 40°C) 32°F to 86°F (0-30°C) when seismic brackets are used
Relative Humidity	up to 95% Non-Condensing (Operating and Non-Operating)
Maximum Altitude Above MSL, ft (m)	4920 (1500) (as per IEC 62040/3) - 1% Maximum kW derate / 100m rise between 1500-3000m

The following are approved branch breakers for the panel boards used in the eXM BDC.

Listed (DIVQ), Schneider Electric Square D branch circuit breakers:

- Type QOB, rated 22 kA, 150 A maximum
- Type QO, rated 22 kA, rated 100 A maximum
- Type QOB, rated 10 kA, rated 100 A maximum
- Type QO, rated 10 kA, rated 100 A maximum

Table 7 Liebert *e*XM BDC, 10-40kVA, mechanical characteristics

Rated Power, kVA	10-40
Dimensions, W x D x H, in (mm)	23.625 x 39.375 x 78.75 (600 x 1000 x 2000)
Weight, lb (kg)	
No Distribution	525 (239)
225A Panelboard	625 (284)
No Distribution & 480V Transformer	1110 (505)
No Distribution & 600V Transformer	1125 (511)
225A Panelboard & 480V Transformer	1210 (550)
225A Panelboard & 600V Transformer	1225 (557)
Color	ZP 7021 (Black)
Protection Degree IEC (60529)	IP20 (finger-proof with front doors open or closed)

Table 8 Liebert *e*XM BDC, 60-100kVA, mechanical characteristics

Rated Power, kVA	**60-100**
Dimensions, W x D x H, in (mm)	23.625 x 39.375 x 78.75 (600 x 1000 x 2000)
Weight, lb (kg)	
No Distribution	550 (250)
Two 225A Subfeed Breakers	660 (300)
400A Panelboard	660 (300)
No Distribution & 480V Transformer	1522 (692)
No Distribution & 600V Transformer	1507 (685
Two 225A Subfeed Breakers & 480V Transformer	1632 (742)
Two 225A Subfeed Breakers & 600V Transformer	1617 (735)
400A Panelboard & 480V Transformer	1632 (742)
400A Panelboard & 600V Transformer	1617 (735)
Color	ZP 7021 (Black)
Protection Degree IEC (60529)	IP20 (finger-proof with front doors open or closed)

Table 9 Liebert *e*XM BDC heat dissipation

Liebert *e*XM BDC Rating kVA	**Liebert *e*XM BDC Heat Dissipation 208:208 Transformer BTU/Hr (kWH)**	**Liebert *e*XM BDC Heat Dissipation 220:208 Transformer BTU/Hr (kWH)**	**Liebert *e*XM BDC Heat Dissipation 480:208 Transformer BTU/Hr (kWH)**	**Liebert *e*XM BDC Heat Dissipation 600:208 Transformer BTU/Hr (kWH)**
10	1757 (0.515)	1566 (0.459)	1638 (0.480)	1661 (0.487)
15	2402 (0.704)	2139 (0.627)	2013 (0.590)	1996 (0.585)
20	2911 (0.853)	2593 (0.760)	2733 (0.801)	2681 (0.786)
30	5012 (1.469)	4538 (1.330)	4948 (1.450)	4999 (1.465)
40	5408 (1.585)	4927 (1.444)	5343 (1.566)	5357 (1.570)
60	7503 (2.199)	6848 (2.007)	6855 (2.009)	6855 (2.009)
80	9875 (2.894)	8967 (2.628)	9513 (2.788)	9516 (2.789)
100	9602 (2.814)	8472 (2.483)	10608 (3.109)	10595 (3.105)

3.1 Electrical Characteristics

NOTE

The breakers and cables used must be in accordance with NEC ANSI/NFPA 70. A disconnect breaker must be provided for AC input, Bypass and AC output. Recommended cable sizes are suitable for operation at a maximum temperature of 104°F (40°C).

Table 10 Liebert eXM BDC input currents, single input, main, without transformer

Voltage 3-Ph, 60 Hz	BDC Rating, kVA	System Input Current A, Max	Phase	Recommended Upstream Protection, A	75°C Wire Current A, Total	Copper Wire	Aluminum Wire	Bolt Size
208/120 220/127	10	34	3W + N + G	45	65	(1) #6	(1) #4	M12
208/120 220/127	15	51	3W + N + G	70	85	(1) #4	(1) #2	M12
208/120 220/127	20	68	3W + N + G	90	115	(1) #2	(1) 1/0	M12
208/120 220/127	30	102	3W + N + G	150	175	(1) 2/0	(1) 4/0	M12
208/120 220/127	40	136	3W + N + G	175	230	(1) 4/0	(2) 1/0	M12
208/120 220/127	60	205	3W + N + G	300	400	(2) 3/0	(2) 4/0	M12
208/120 220/127	80	273	3W + N + G	350	460	(2) 4/0	(2) 300kcmil	M12
208/120 220/127	100	341	3W + N + G	450	610	(2) 350kcmil	(2) 400kcmil	M12

Table 11 Liebert eXM BDC input currents, dual input, rectifier, without transformer

Voltage 3-Phase 60Hz)	BDC Rating, kVA	Rectifier Input Current RIB, A, Max	Rectifier Recommended Upstream Protection, A	Phase	75°C Wire Current A, Total	Copper Wire	Aluminum Wire	Bolt Size
208/120 220/127	10	34	45	3W + N + G	65	(1) #6	(1) #4	M12
208/120 220/127	15	51	70	3W + N + G	85	(1) #3	(1) #2	M12
208/120 220/127	20	68	90	3W + N + G	115	(1) #2	(1) 1/0	M12
208/120 220/127	30	102	150	3W + N + G	175	(1) 2/0	(1) 4/0	M12
208/120 220/127	40	136	175	3W + N + G	230	(1) 4/0	(2) 1/0	M12
208/120 220/127	60	205	300	3W + N + G	400	(2) 3/0	(2) 4/0	M12
208/120 220/127	80	273	350	3W + N + G	460	(2) 4/0	(2) 300kcmil	M12
208/120 220/127	100	341	450	3W + N + G	610	(2) 350kcmil	(2) 400kcmil	M12

Refer to **Figures 26** and **27** for additional details about this system configuration.

Table 12 Liebert *e*XM BDC input currents, dual input, bypass, without transformer

Voltage 3-Ph, 60 Hz	BDC Rating kVA	Bypass Input Current BIB/MBB A, Max	Bypass Recommended Upstream Protection, A	Phase	75°C Wire Current A Total	Copper Wire	Aluminum Wire	Bolt Size
208/120 220/127	10	28	40	3W + N + G	50	(1) #6	(1) #4	M12
208/120 220/127	15	42	70	3W + N + G	85	(1) #4	(1) #2	M12
208/120 220/127	20	56	80	3W + N + G	115	(1) #2	(1) #2	M12
208/120 220/127	30	83	125	3W + N + G	130	(1) 1/0	(1) 2/0	M12
208/120 220/127	40	111	175	3W + N + G	175	(1) 3/0	(1) 4/0	M12
208/120 220/127	60	167	250	3W + N + G	285	(1) 350kcmil	(2) 2/0	M12
208/120 220/127	80	222	350	3W + N + G	400	(2) 3/0	(2) 4/0	M12
208/120 220/127	100	278	450	3W + N + G	460	(2) 4/0	(2) 300 kcmil	M12

Refer to **Figures 26** and **27** for additional details about this system configuration.

Table 13 Liebert *e*XM BDC output currents

Voltage 3-Ph, 60Hz)	BDC Rating, kVA	System Output Current A, Max	Phase	Recommended Upstream Protection, A	75°C Wire Current A, Total	Copper Wire	Aluminum Wire	Bolt Size
208/120 220/127	10	28	3W + N + G	40	50	(1) #6	(1) #4	M12
208/120 220/127	15	42	3W + N + G	60	85	(1) #4	(1) #2	M12
208/120 220/127	20	56	3W + N + G	70	115	(1) #2	(1) #2	M12
208/120 220/127	30	83	3W + N + G	110	130	(1) 1/0	(1) 2/0	M12
208/120 220/127	40	111	3W + N + G	150	175	(1) 3/0	(1) 4/0	M12
208/120 220/127	60	167	3W + N + G	225	285	(1) 350kcmil	(2) 2/0	M12
208/120 220/127	80	222	3W + N + G	300	400	(2) 3/0	(2) 4/0	M12
208/120 220/127	100	278	3W + N + G	350	460	(2) 4/0	(2) 300kcmil	M12

Table 14 Recommended lug sizes (compression type) M12, 1/2" bolt

Cable Size	T&B Copper Two Hole	T&B Aluminum Two Hole
#6AWG	256-030695-868	—
#4AWG	256-030695-733	—
#2-3AWG	54811BE	—
#1AWG	54857BE	—
#1/0AWG	256-30695-593	—
#2/0AWG	54862BE	60238
#3/0AWG	54864BE	60244
#4/0AWG	54866BE	60250
250kcmil	54868BE	60256
300kcmil	54870BE	60262
350kcmil	54872BE	60267
400kcmil	54874BE	60269
500kcmil	54876BE	60273
600kcmil	54878BE	60275
700kcmil	54879BE	60277
750kcmil	54880BE	60278

3.2 Torque Requirements

All electrical connections must be tight.

Tables 15 and **16** provide the torque values for the connections to the Liebert *e*XM BDC. Use these values unless the equipment is labeled otherwise.

Table 15 Busbar torque for power wiring

Bolt Shaft Size	Torque Lb-in (Nm)
3/8" (M10)	192 (22)
1/2" (M12)	428 (48)

Table 16 Terminal block torque with compression lugs for control wiring

AWG Wire Size or Range	Torque Lb-in (Nm)
#22 - #14	3.5 to 5.3 (0.4 to 0.6)

NOTE

Refer to the manufacturer's data for proper torque for circuit breaker power connections.

Table 17 Breaker torque

ABB	Nm	Siemens	Nm
Tmax2	7.0	D Frame	5.5
Tmax3	8.0	F Frame	22.0
Tmax5	25.0	J Frame	31.0

Table 18 Electrical data—Liebert *e*XM BDC, 480VAC input, 208VAC output, single input, with 480V:208V transformer

Liebert eXM BDC Rating kVA	Maximum System Input Current, A	Phase	Recommended Upstream Protection, A	75°C Wire Current A Total	Copper Wire	Aluminum Wire	Bolt Size
10	15	3W + G	20	40	(1) #8	(1) #8	M12
15	23	3W + G	30	40	(1) #8	(1) #8	M12
20	31	3W + G	40	40	(1) #8	(1) #8	M12
30	46	3W + G	60	65	(1) #6	(1) #4	M12
40	61	3W + G	80	85	(1) #4	(1) #2	M12
60	91	3W + G	125	150	(1) #2	(1) 1/0	M12
80	122	3W + G	175	200	(1) 1/0	(1) 3/0	M12
100	152	3W + G	200	205	(1) 4/0	(1) 250 kcmil	M12

See **Notes on Tables on page 41**.

Table 19 Electrical data—Liebert *e*XM BDC, 600VAC input, 208VAC output, single input, with 600V:208V transformer

Liebert *e*XM BDC Rating kVA	Maximum System Input Current, A	Phase	Recommended Upstream Protection, A	75°C Wire Current A Total	Copper Wire	Aluminum Wire	Bolt Size
10	12	3W + G	20	40	(1) #8	(1) #8	M12
15	18	3W + G	25	40	(1) #8	(1) #8	M12
20	25	3W + G	35	40	(1) #8	(1) #8	M12
30	37	3W + G	50	50	(1) #8	(1) #6	M12
40	49	3W + G	70	65	(1) #5	(1) #4	M12
60	73	3W + G	100	90	(1) #3	(1) #2	M12
80	98	3W + G	125	120	(1) #1	(1) 1/0	M12
100	122	3W + G	175	150	(1) 1/0	(1) 3/0	M12

See **Notes on Tables on page 41**.

Table 20 Electrical data—Liebert *e*XM BDC, 208VAC or 220VAC input, single input, with 208V:208V or 220V:220V transformer

Liebert *e*XM BDC Rating kVA	Maximum System Input Current, A	Phase	Recommended Upstream Protection, A	75°C Wire Current A Total	Copper Wire	Aluminum Wire	Bolt Size
10	36	3W + G	45	65	(1) #6	(1) #4	M12
15	53	3W + G	70	85	(1) #4	(1) #2	M12
20	71	3W + G	90	100	(1) #3	(1) #1	M12
30	107	3W + G	150	175	(1) 2/0	(1) 4/0	M12
40	141	3W + G	200	230	(1) 4/0	(1) 300 kcmil	M12
60	211	3W + G	300	335	(1) 400 kcmil	(2) 4/0	M12
80	281	3W + G	400	460	(2) 4/0	(2) 300 kcmil	M12
100	352	3W + G	450	510	(2) 250 kcmil	(2) 400 kcmil	M12

See **Notes on Tables** below.

Notes on Tables

Notes apply to **Tables 18** through **20**.

1. Nominal input current (considered continuous) is based on full rated output load maximum current includes nominal input current and maximum battery recharge current (considered noncontinuous). Continuous and noncontinuous current are defined in NEC 100. Recommended overcurrent protection is based on 80% rated devices.

   *The recommended overcurrent protection represents 125% of nominal full load current (continuous) per NEC 215.
2. Maximum input current is controlled by the current limit setting.
3. Recommended AC input external overcurrent protection is based on 80% rated devices and maximum input current limit setting.
4. Recommended AC output external overcurrent protection is based on 80% rated devices and full rated output current.
5. Nominal battery voltage is shown at 2 volts per cell.
6. Input power factor of 0.99 is used for the calculations.

Notes

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